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JULY 1950

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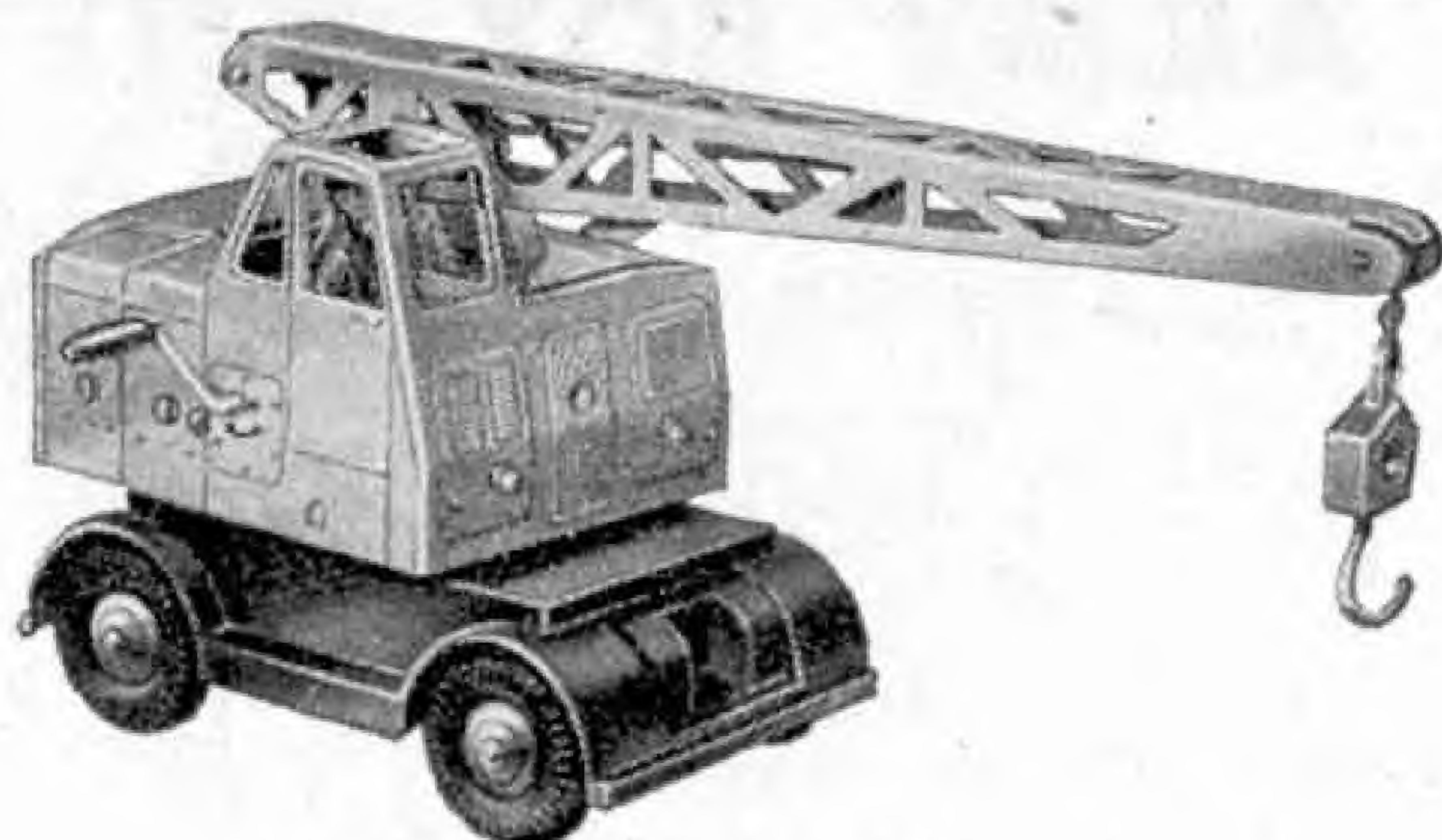


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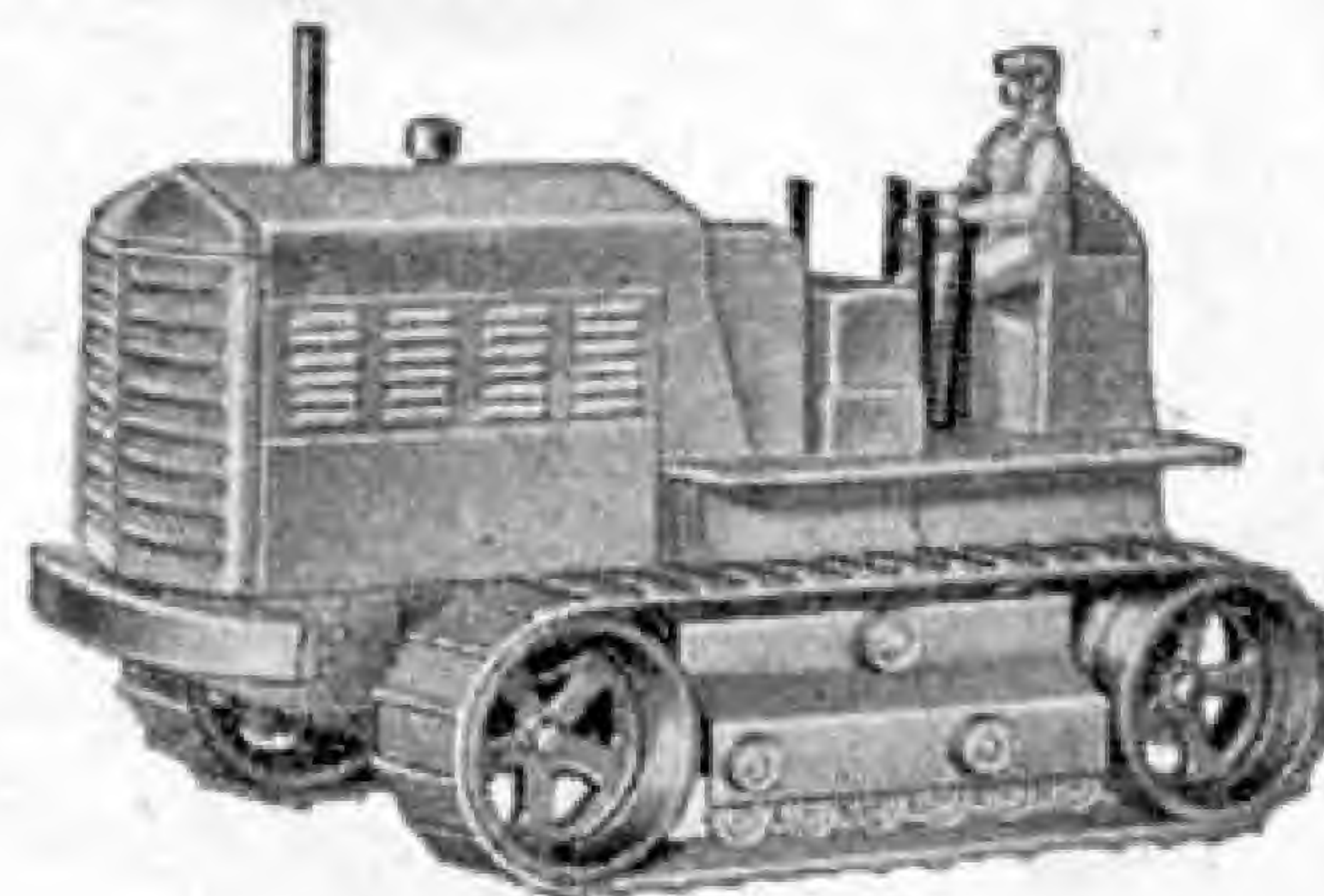
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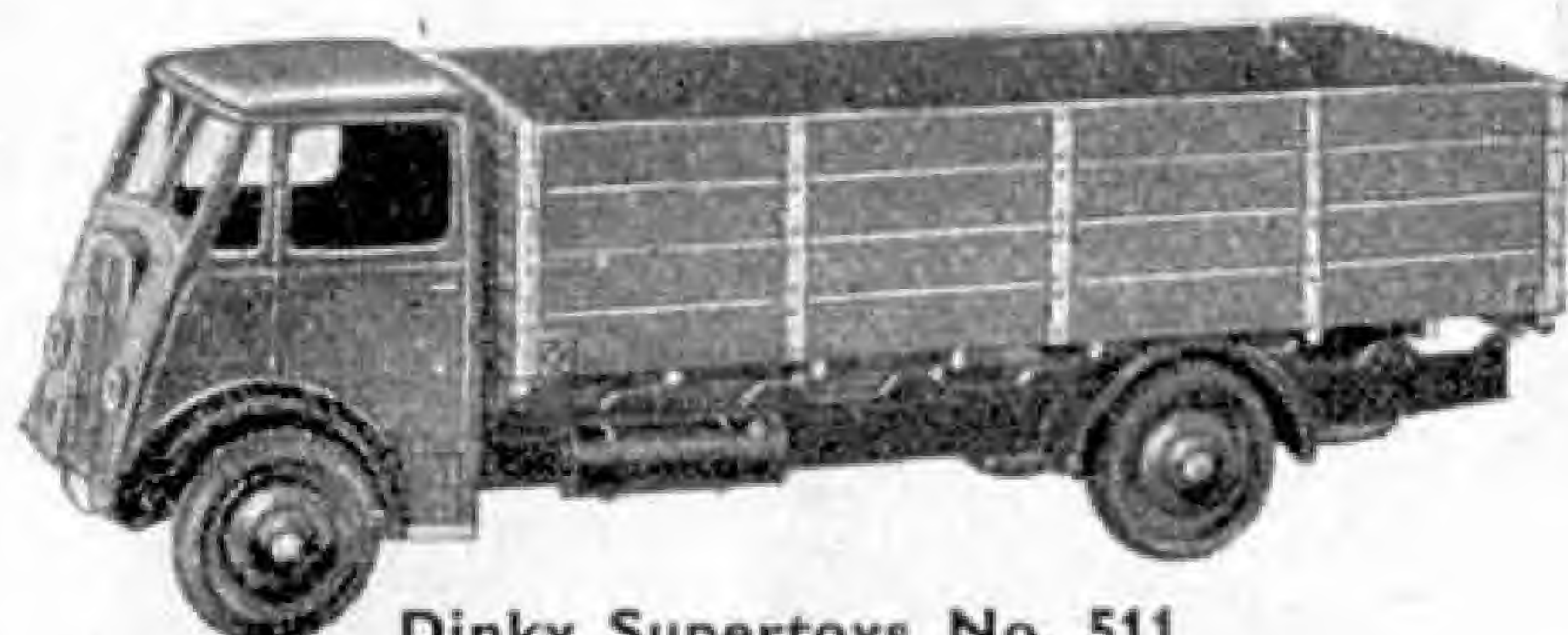
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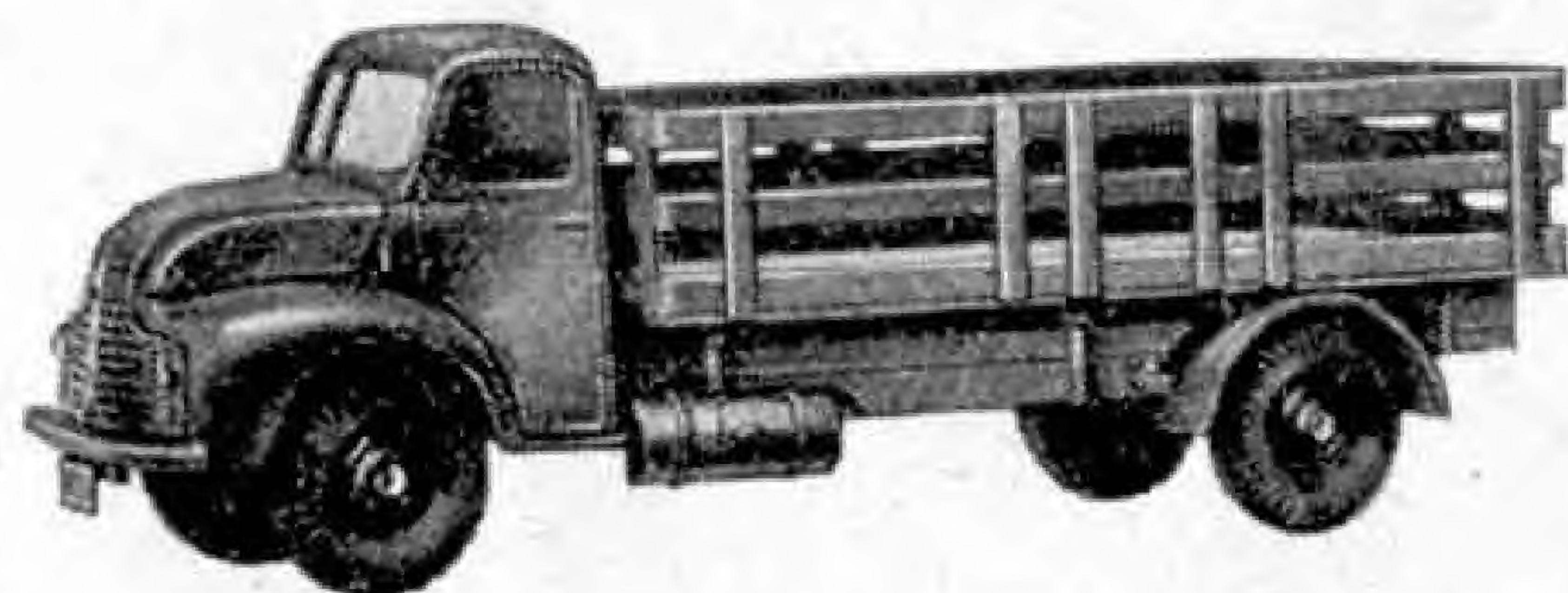
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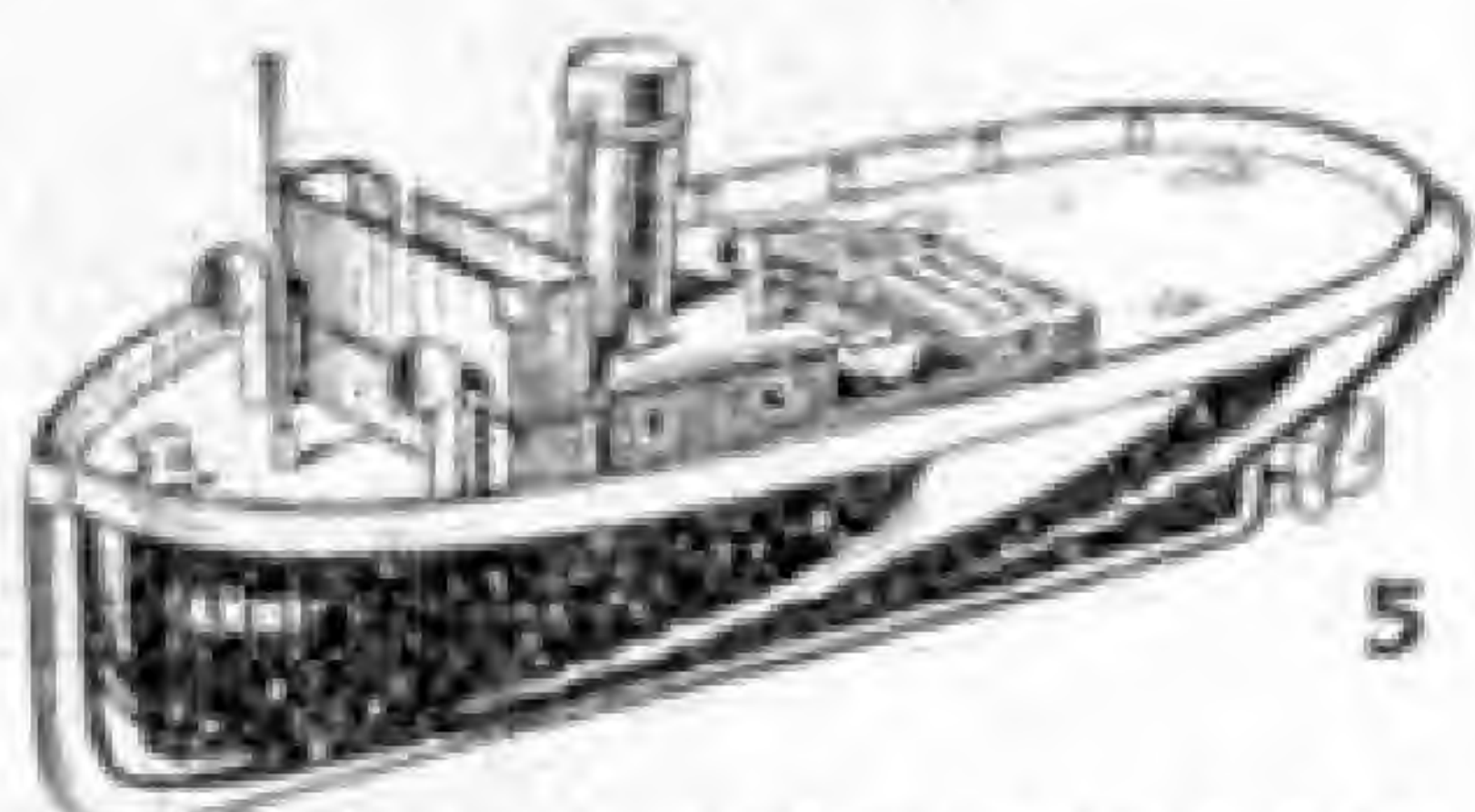
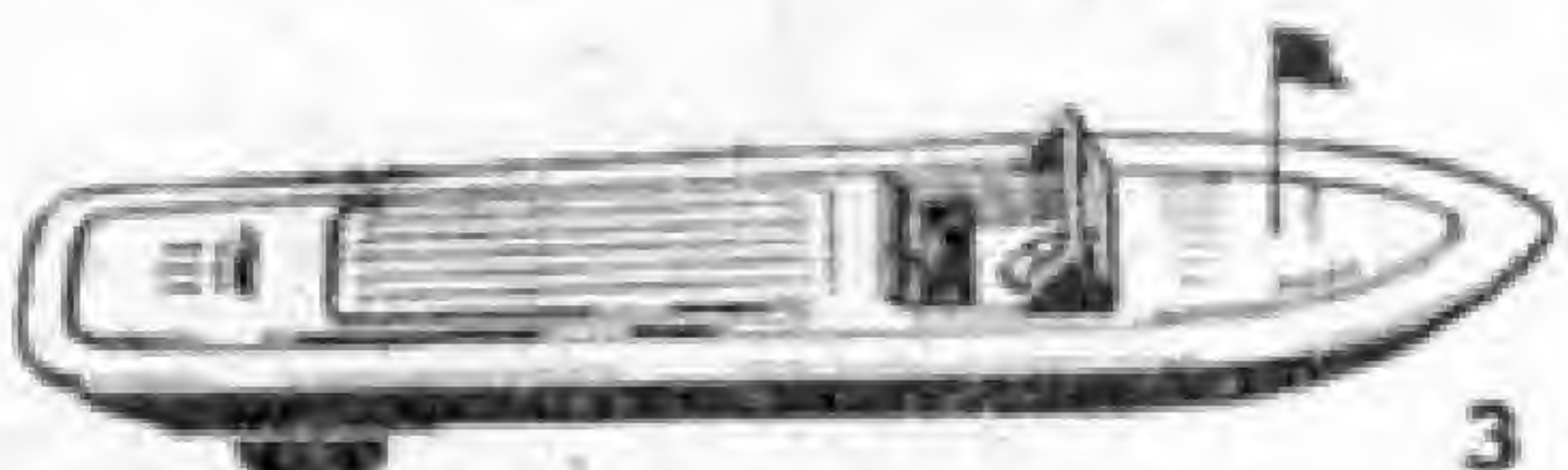
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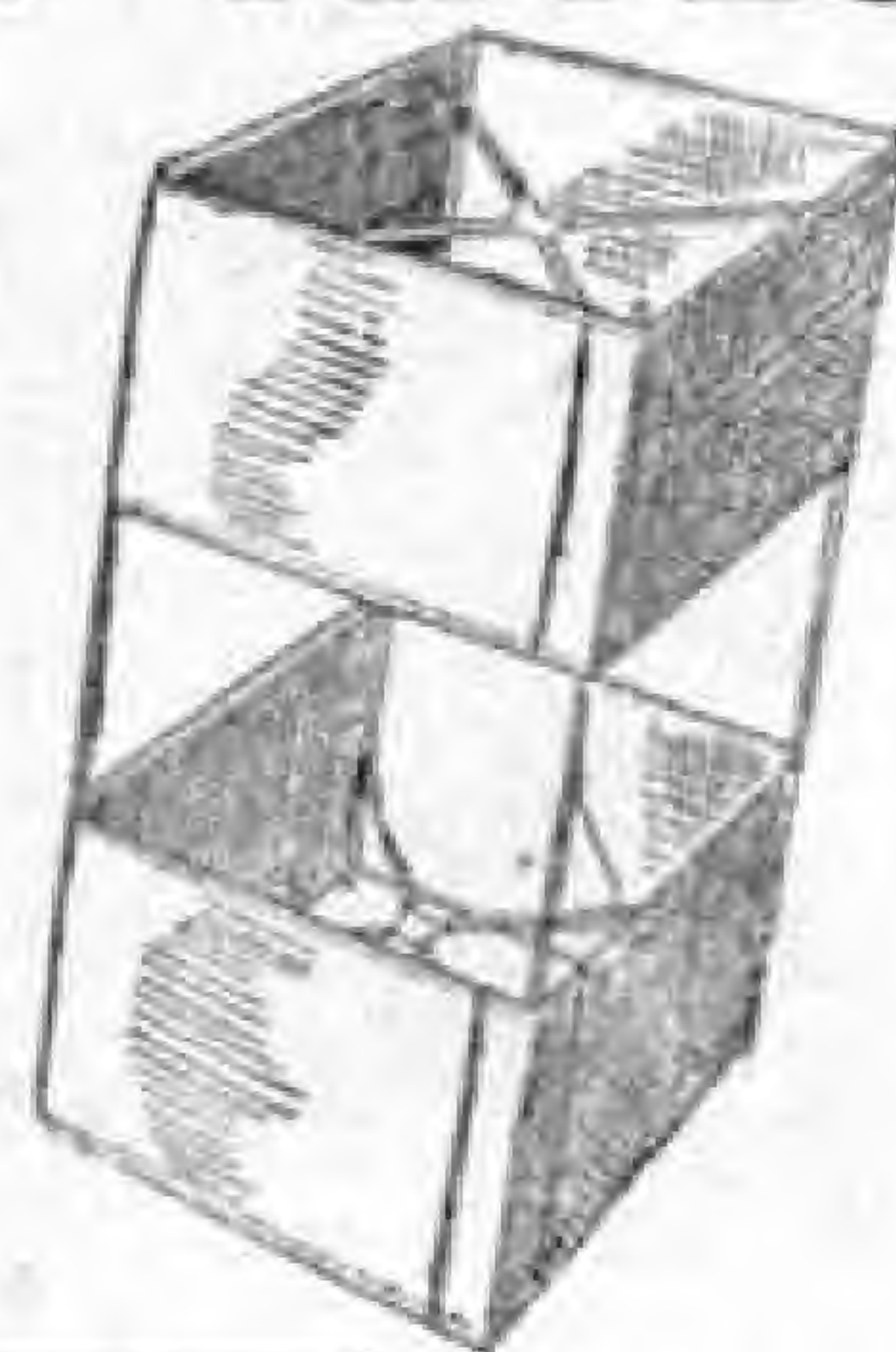
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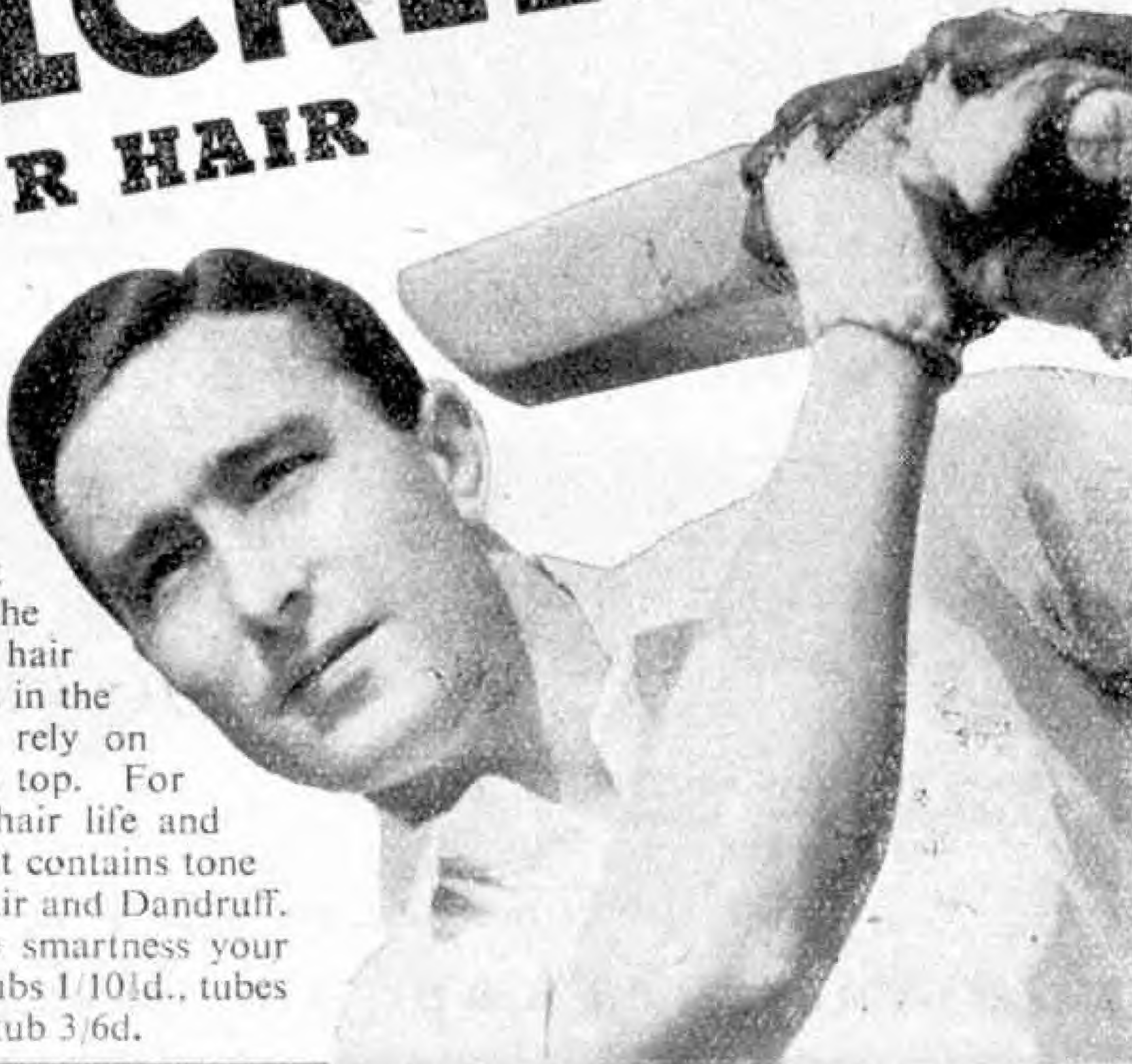
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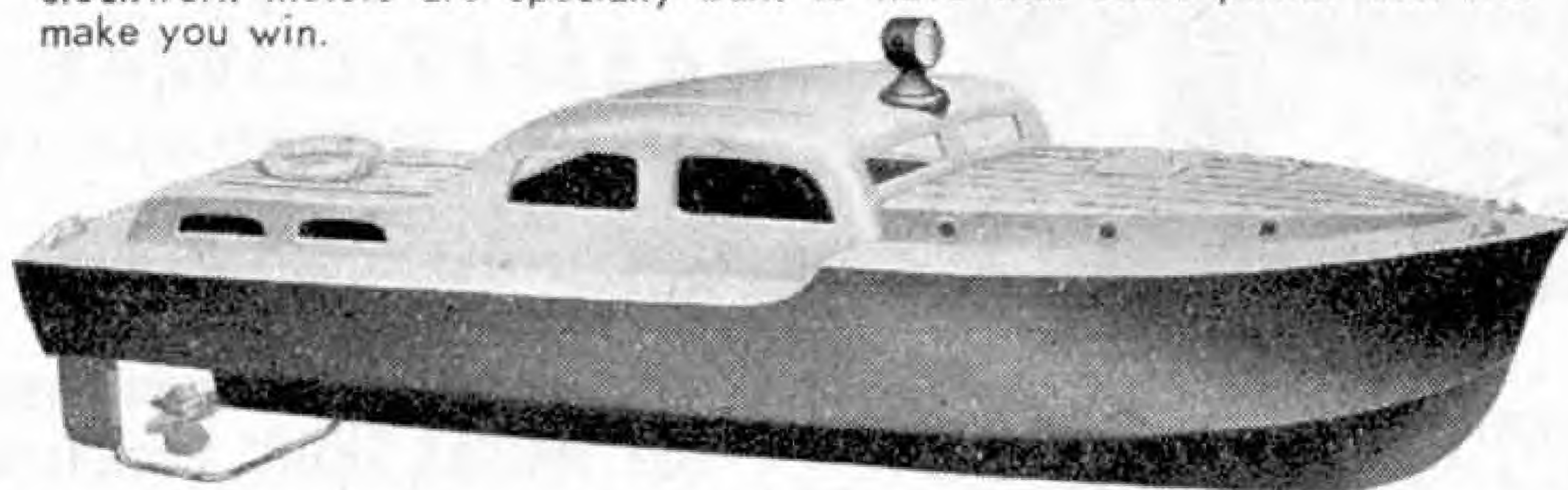
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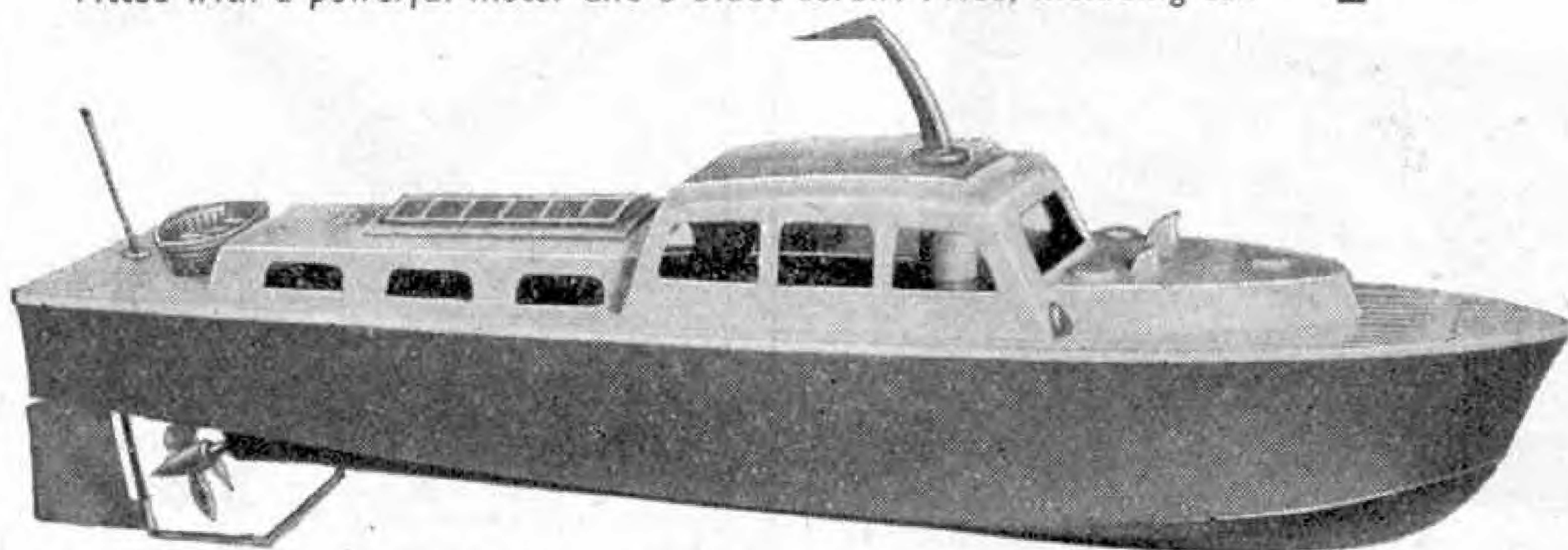
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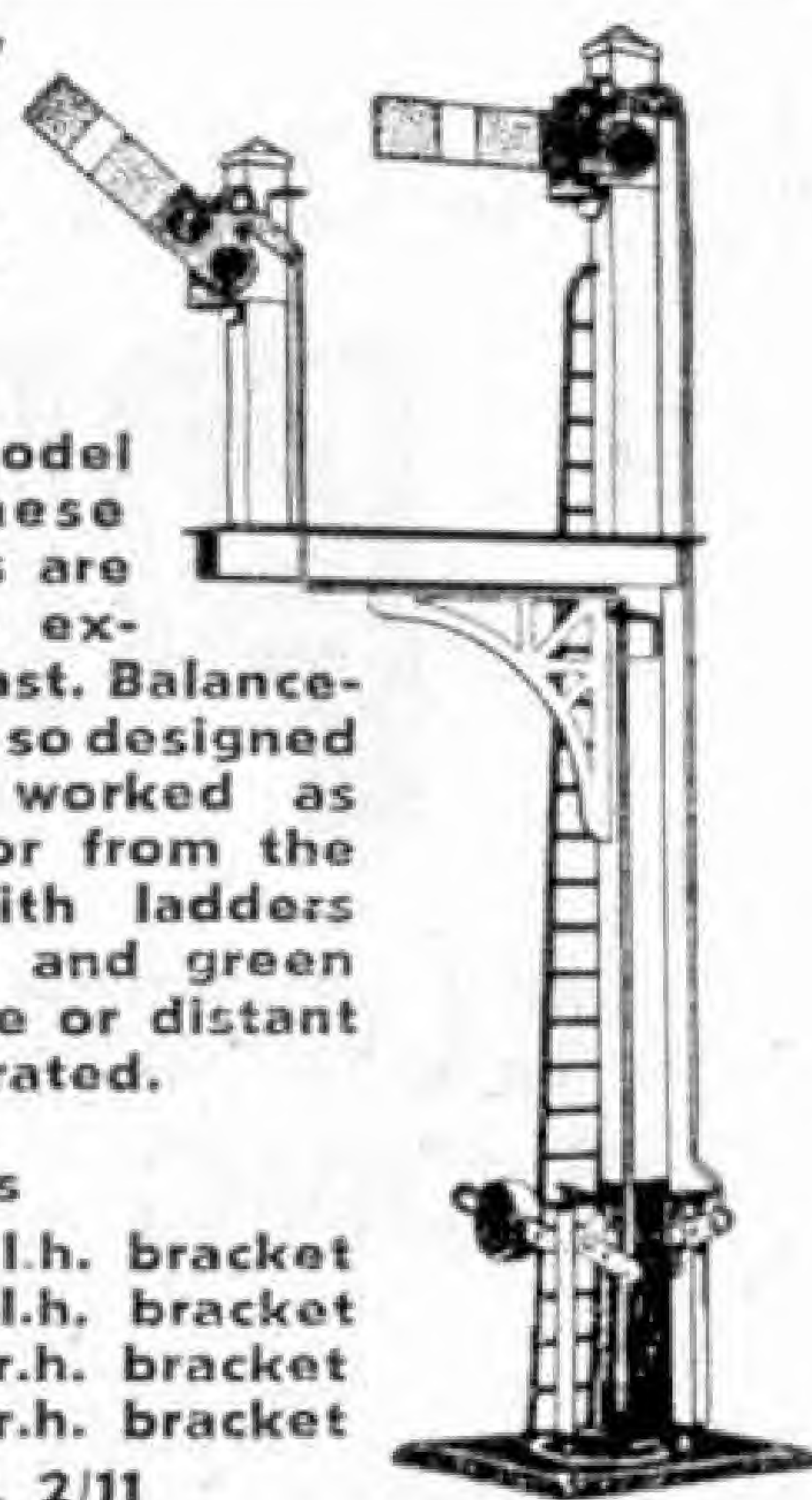
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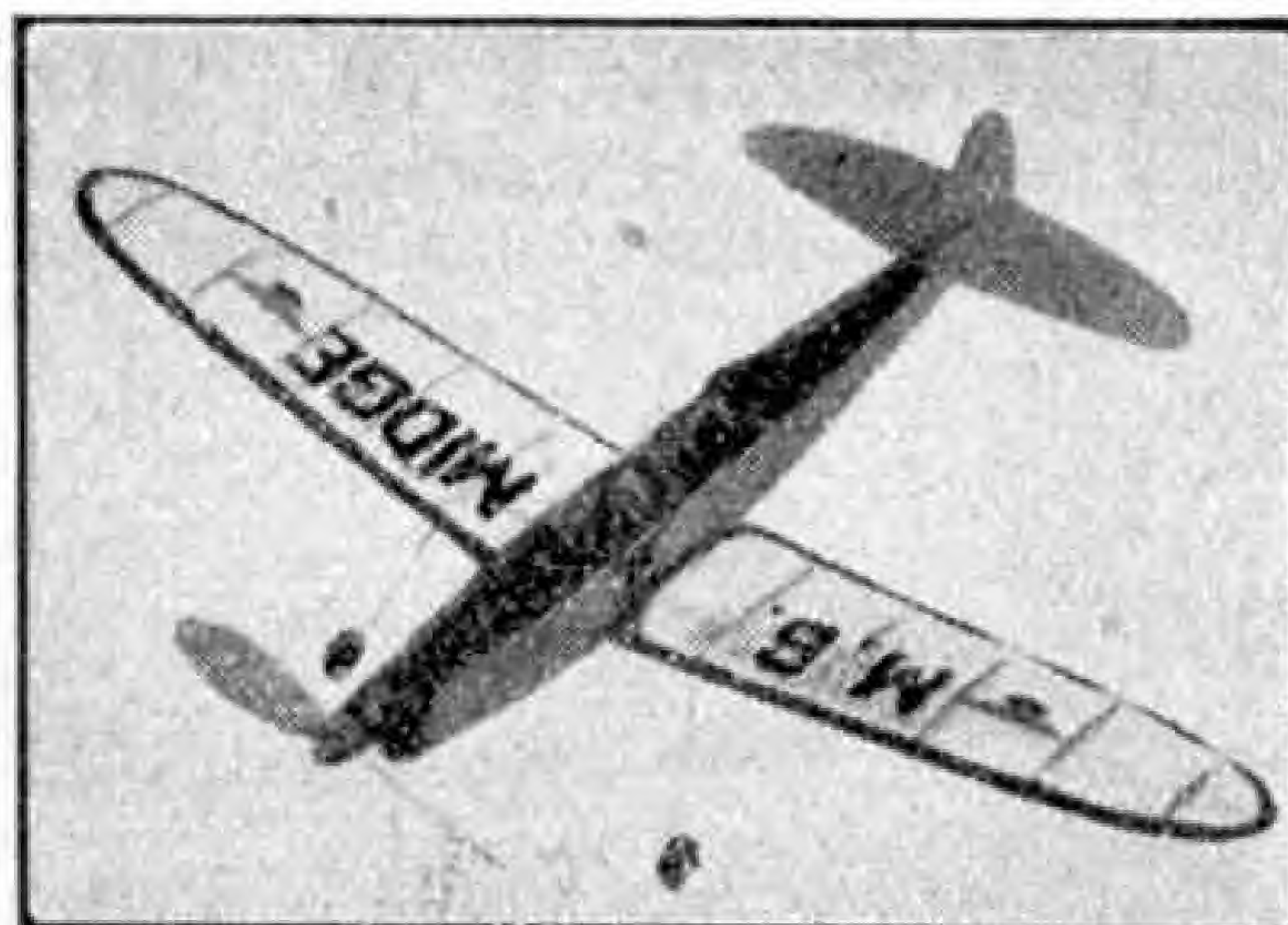
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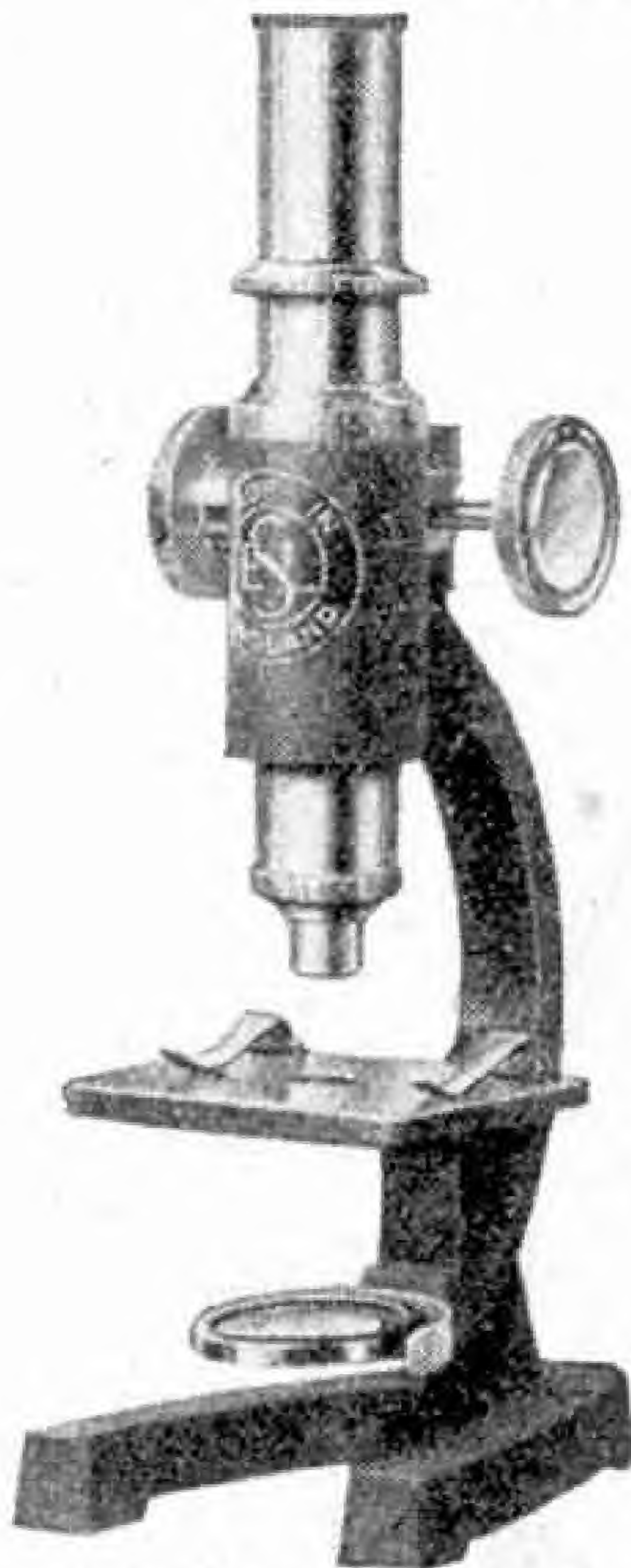
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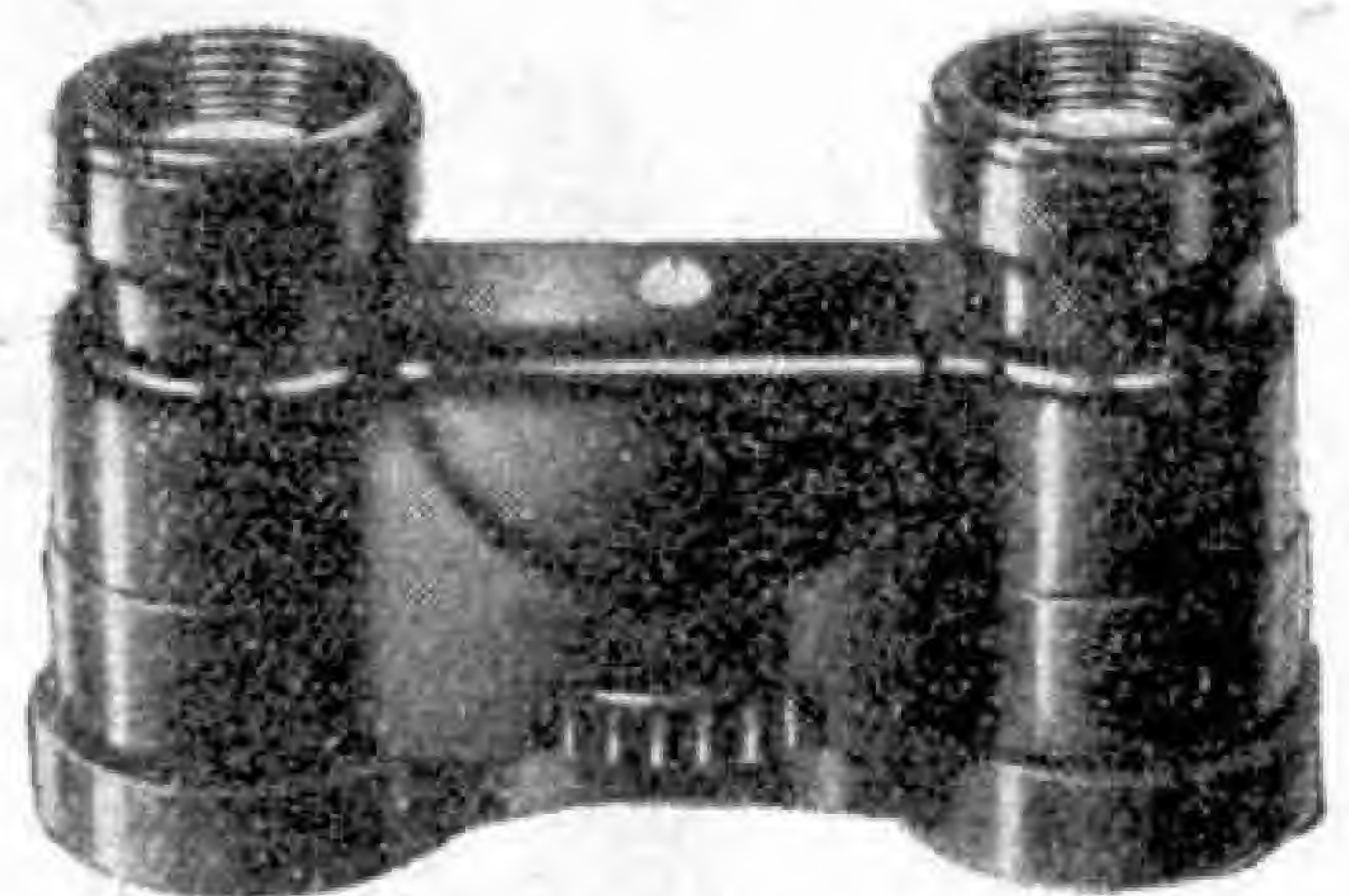
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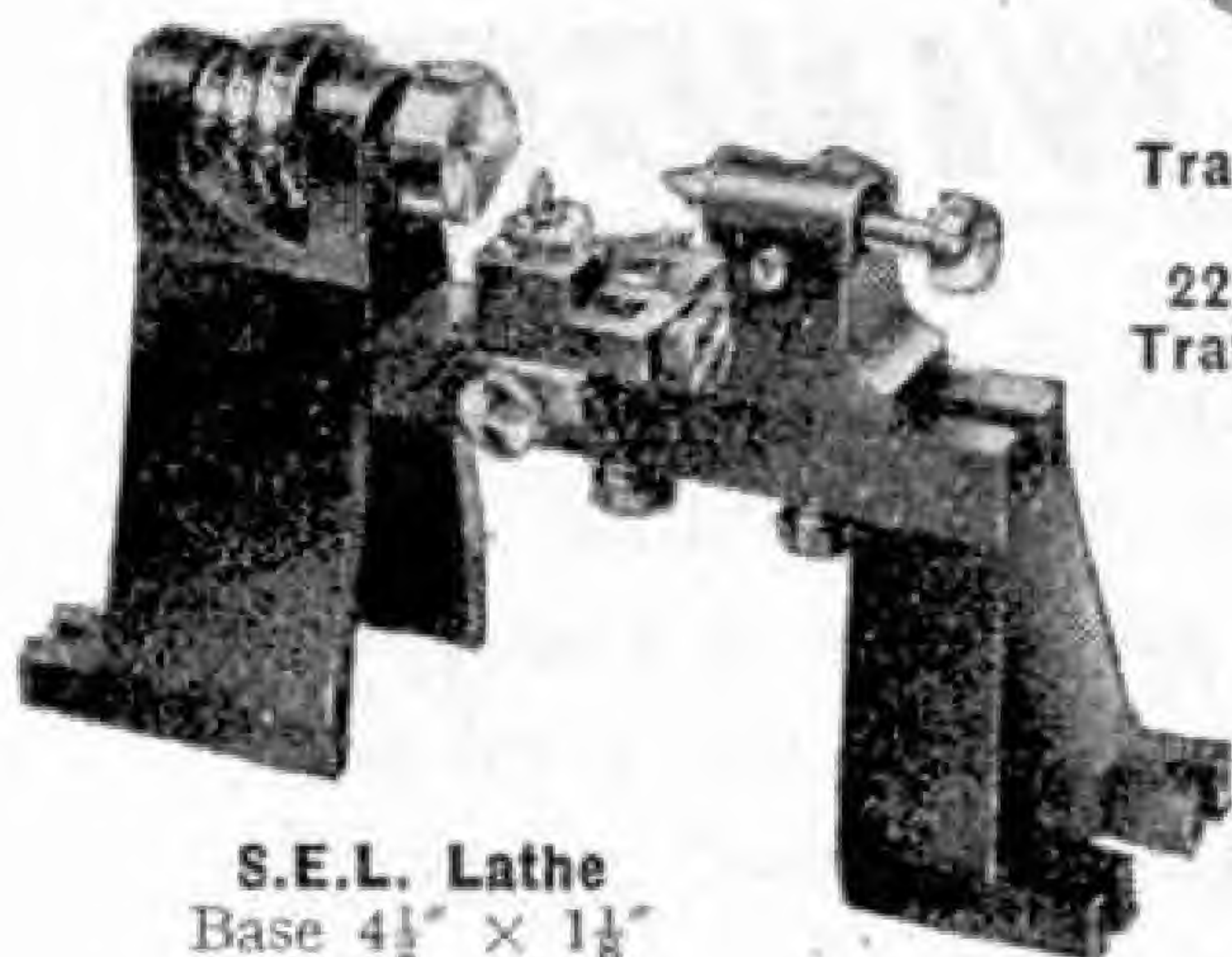
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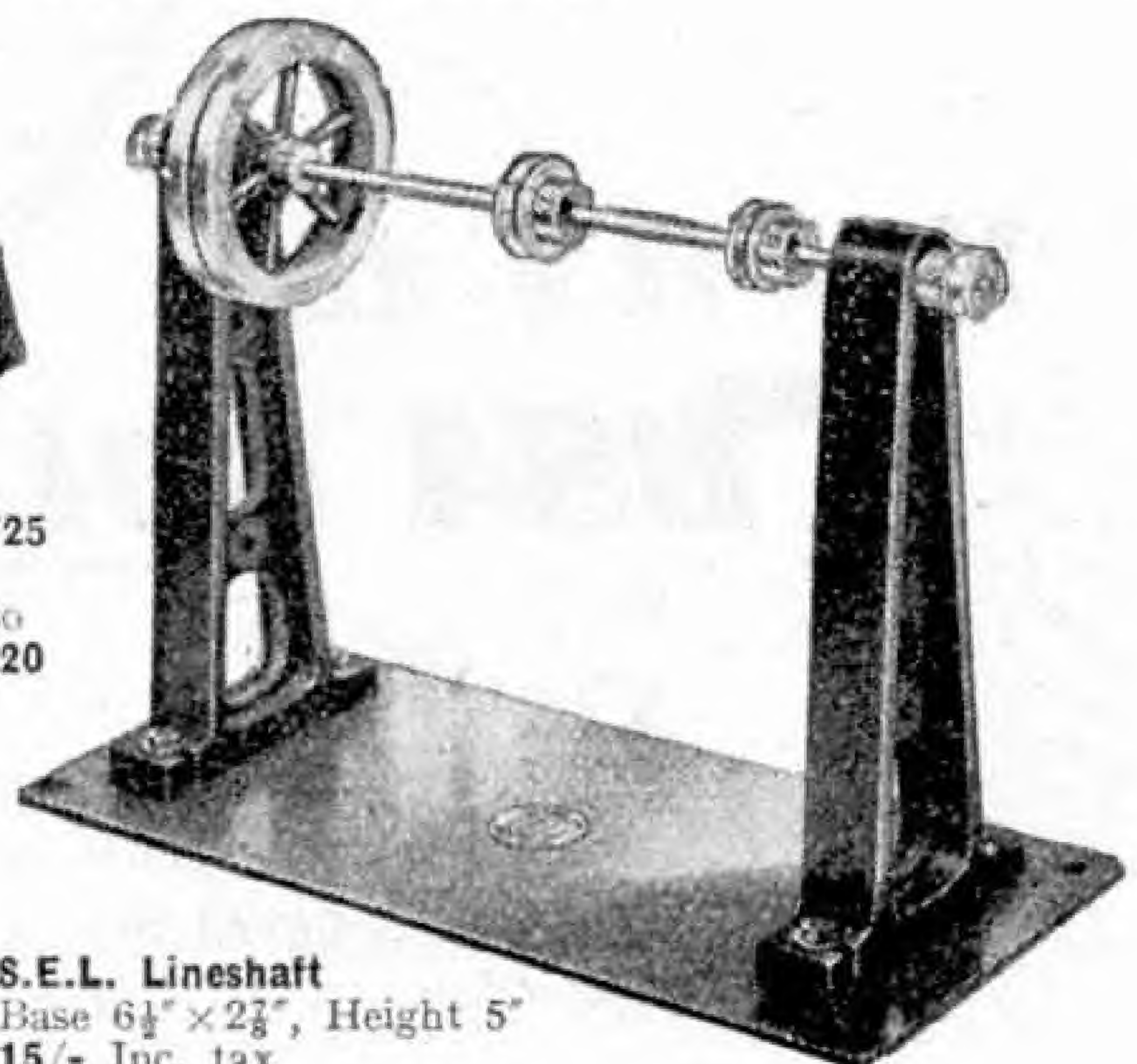
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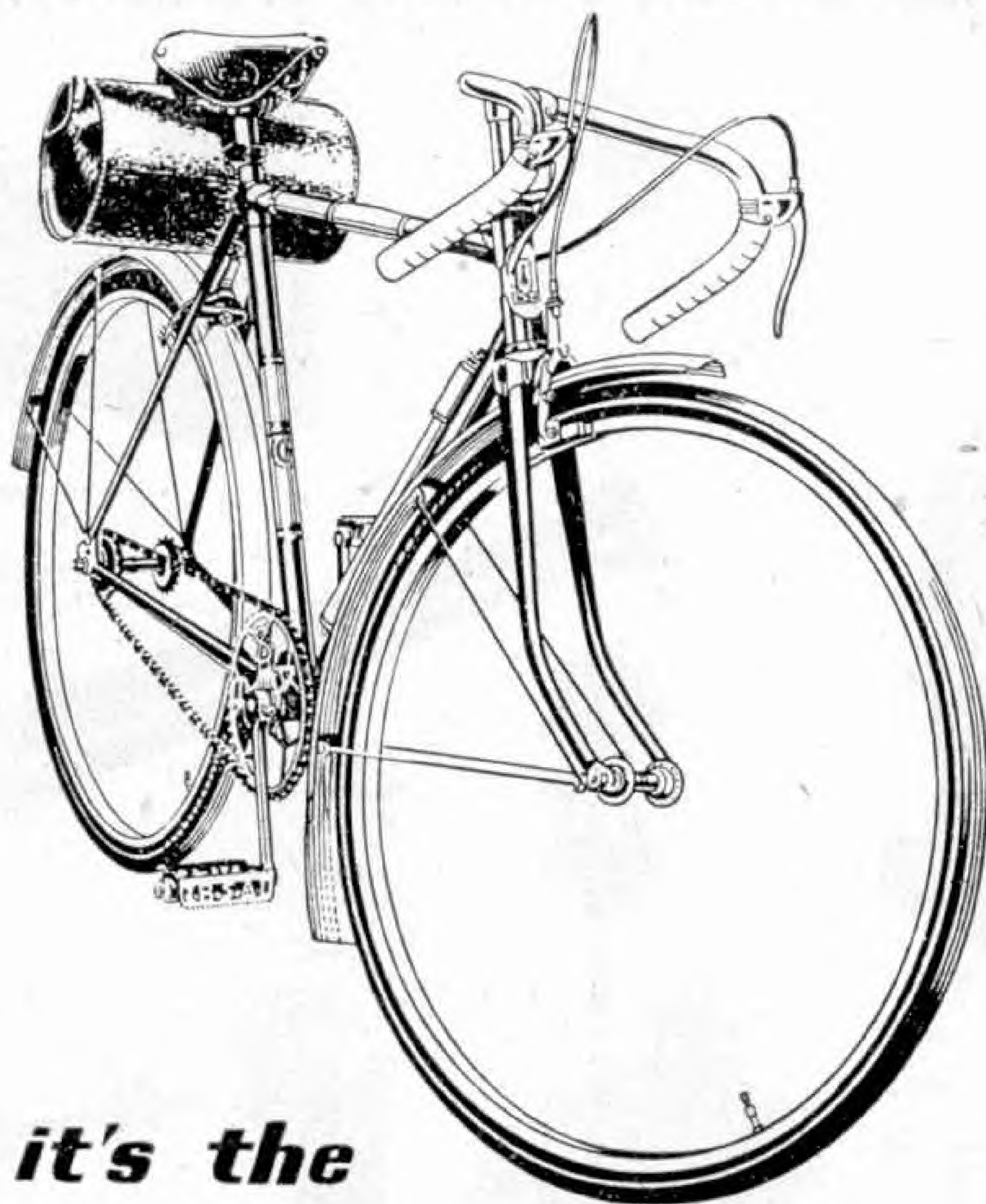
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MAGAZINE

Editorial Office:
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Vol. XXXV
No. 7
July 1950

With the Editor

The R.A.F. Display

Before the war, the annual Royal Air Force Display at Hendon was one of the most popular and thrilling social events of the year. It was staged in an atmosphere of gaiety and pageantry; yet it was more than just an air circus, for here one could watch the finest aerobatic flying in the world, combined with practical demonstrations of the might of Britain's growing Air Force. Nobody seemed to mind if a target disappeared in a puff of smoke before the bombs had left attacking aircraft, for they knew that these same machines would eliminate a real target with real bombs if necessity ever arose.

The last Hendon Display was held in 1937. After that our fighters and bombers were too fast or too big to operate from Hendon's small grass airfield, and to demonstrate their qualities over such a densely-populated area. But three years later they showed those qualities far more effectively by winning the Battle of Britain and then carrying the war into the enemy's camp.

Now the R.A.F. Display is being revived, not at Hendon, but at Farnborough, home of so many of the brilliant operational devices and ideas which have helped to make British aircraft second-to-none in the world.

Those of us who remember the scarlet-winged "Gamecocks," vicious little "Flycatchers" and impeccable "Fury" biplanes will miss the raucous note of their piston-engines and the familiar atmosphere of Hendon. Those who do not will find a new kind of thrill at Farnborough on the 7th and 8th of this month, as the R.A.F.'s finest pilots demonstrate their jet fighters and bombers with the same old skill and dash as their predecessors, but at speeds undreamed of thirteen years ago.

A Battle of the Gauges

The article on page 312, dealing with Australia's railway gauge problem, brings to mind our own gauge problem in England over 100 years ago. Here the Stephenson gauge of 4 ft. 8½ in. won the day from the 7 ft. 0¼ in. gauge adopted by Brunel on the G.W.R. This broad gauge did not finally disappear until 1892.

The problem in Australia is a complex one as there have been three different gauges in active development for many years, two of which must now disappear. The proposal is that the Stephenson gauge should form the future standard.

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Drilling an Oil Well

By T. Holloway

ALTHOUGH great strides have been made in the science of locating oil, only the drill can tell if oil is present in commercial quantities. The first well to be drilled successfully was completed in 1859, oil being discovered at a depth of 69 ft. During the past 90 years more than a million wells have been drilled and oil can now be produced from depths of over 14,000 ft.

Early wells were all drilled by the "cable-tool" or "percussion" system, in which a chisel-shaped tool, heavily weighted, was raised and lowered and so made to punch its way into the earth. Most modern wells, however, are drilled by the rotary system, a speedier and more efficient technique in which the hole is made by the rotating action of a cutting head.

The first task in rotary drilling is to excavate a cellar 6 ft. to 25 ft. deep and up to 15 ft. square in which to house the well-head fittings, etc., beneath the derrick floor. As may be imagined, a considerable amount of drilling equipment is required, the chief items being the derrick, the draw-works or hoist by which the drillpipe and casing are raised and lowered, the turntable that rotates the drillpipe, slush pumps, a power unit and the drilling "string." The total weight of all this gear may be as much as 350 tons, not including the casing with which the well is lined and which may weigh another 300 tons. At the top of the derrick is mounted the "crown" block from which, by means of pulleys and travelling block, the "swivel" is suspended on wire ropes. This is a rotating joint to which the drilling string is attached.

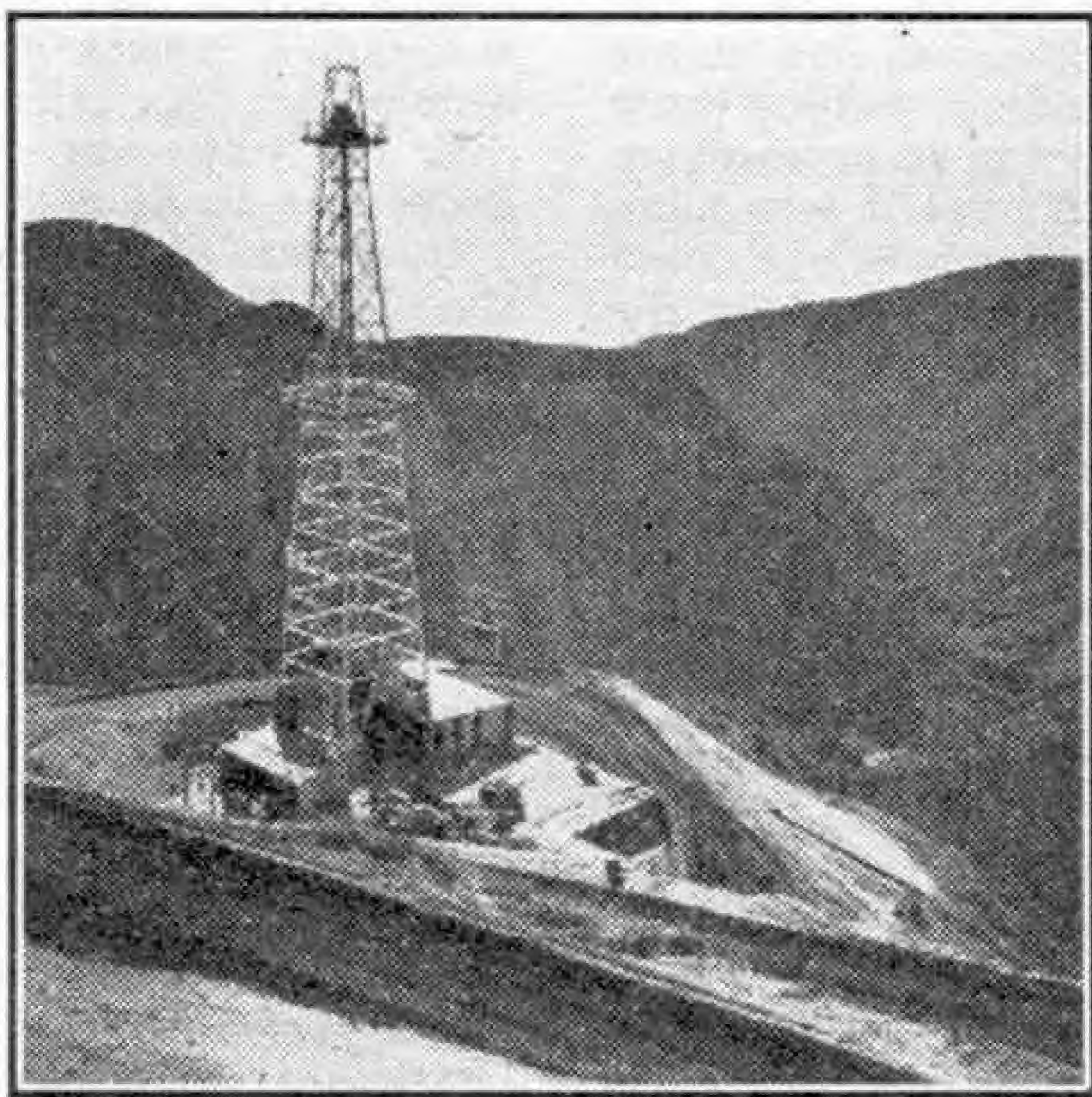
The drilling string may be divided into four sections, "kelly," drillpipe, drill collars and "bit." The kelly is of square or hexagonal cross-section. It fits into a suitably shaped hole in the rotary table which, driven by a power unit, rotates the drillpipe and so causes the bit to cut or chip through the rock after the manner of a carpenter's brace and bit.

The drillpipe is screwed to the lower end of the kelly, and as the hole increases in depth the kelly and the drilling string are lowered through the turntable until only a short length of the kelly remains above it. It then becomes necessary to add a fresh section of drillpipe, usually about 30 ft. in length. This is done by raising the complete drilling string until the kelly is clear of the turntable; the topmost length of drillpipe is then held firmly in position in the turntable, the kelly is removed, and the new section of drillpipe is added. The drill-

ing string is then lowered once more, the kelly reconnected, and drilling resumed.

It is of interest to note that at a depth of 5,000 ft. the entire drilling string may weigh 50 tons. Not all this weight is allowed to bear on the bit however, as the brake on the draw-works can reduce it to pounds instead of tons. Even so, the effective life of the bit is very short. Usually it has to be renewed after drilling 200 ft., but where exceptionally hard rock is encountered as little as two feet of drilling may necessitate a replacement.

While drilling operations are in progress, mud has to be circulated around the well bore in order to remove the rock chippings formed by the action of the bit, and also to keep the bit cool and to plaster the



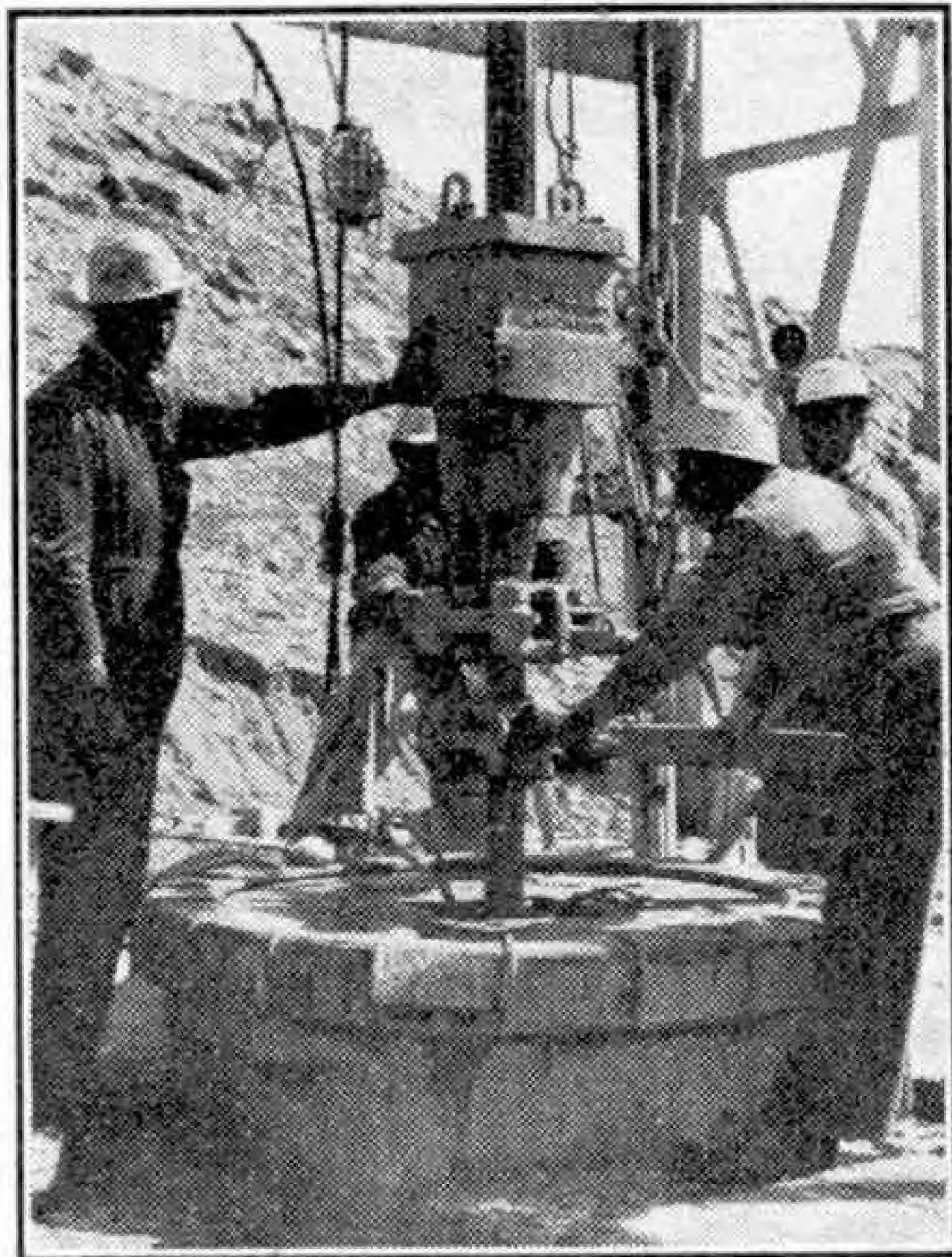
A derrick in a Californian oil field, overlooking the Pacific Ocean. The illustrations to this article are reproduced by courtesy of the Petroleum Information Bureau.

walls of the well to prevent caving in.

The drilling mud may be prepared from local clays or shale, or comprise a special mixture to suit local conditions. It is stored in pits or steel tanks from which it is pumped, by the slush pump, through a flexible hosepipe coupled to the rotary swivel. It travels down through the kelly and the drillpipe and out through holes in the bit, and is then forced up between the outside of the drillpipe and the walls of the well, returning to the surface.

The rate of drilling varies with the type of formation encountered and the type of bit used. Under ideal conditions it may be as much as 200 ft. an hour, but through exceptionally hard rock progress is sometimes less than a foot an hour. In soft strata, a multibladed drag-bit is often used, but for the tackling hard formations bits whose cutting edges are studded with industrial diamonds are preferred.

For drilling a deep well a 23-in. bit is normally used for the first few hundred feet. The drilling string is then removed and casing is inserted. This, like the drillpipe, is in 30 ft. lengths, screwed into each other by power-operated tongs. The casing is of somewhat smaller diameter than the hole; thus, in an 18-in. well, a casing of 16-in. diameter is used. After the casing has been inserted, cement is pumped down it to force the mud out of the well. A cementing plug shaped like a piston is then inserted and this in turn is followed by more mud, which drives

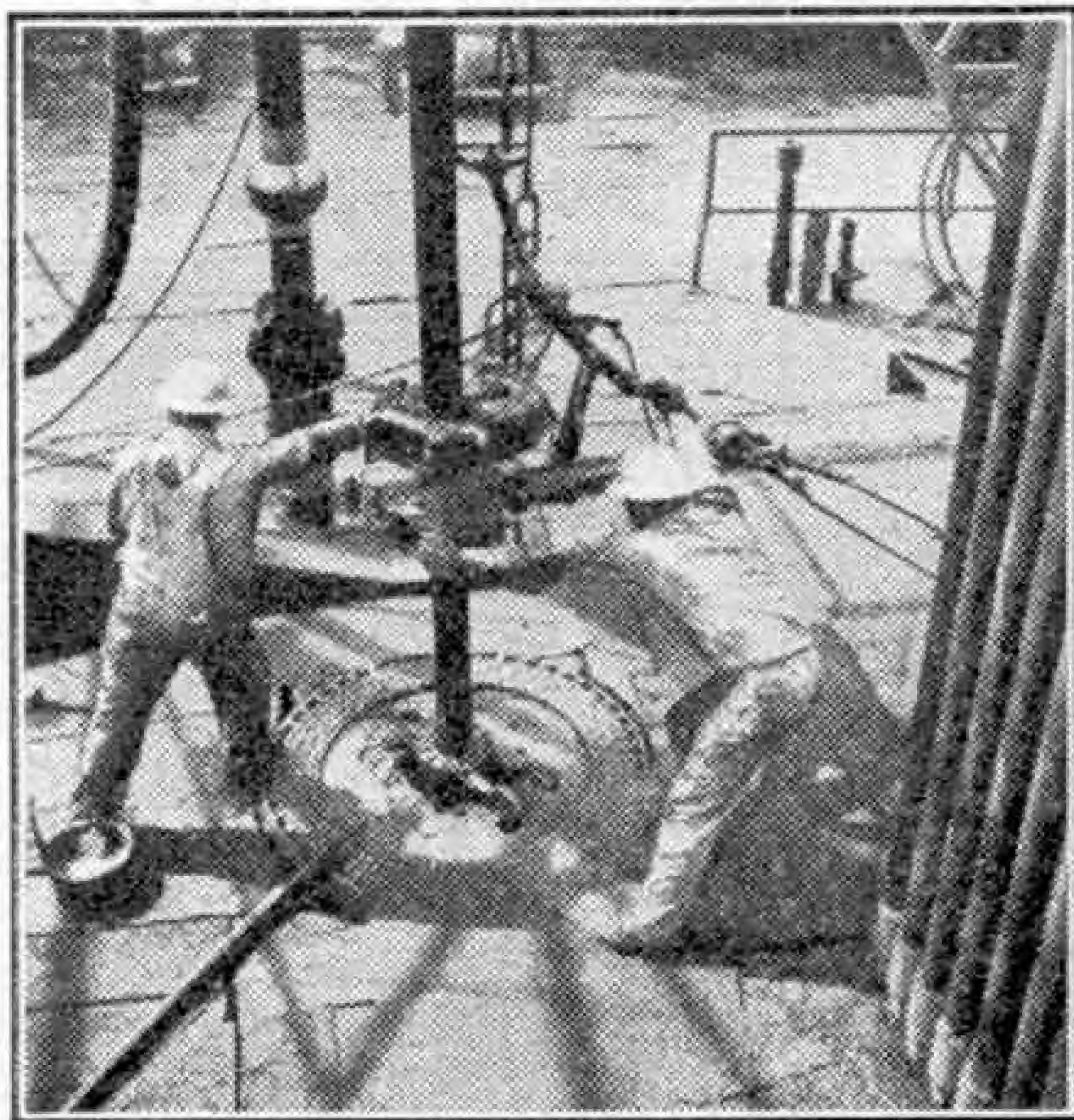


Bringing a drillpipe out of the bore hole in readiness for adding a new pipe.

the plug downward and forces the cement up between the outside of the casing and the walls of the well. The cement not only fixes the casing in place, but also seals off any water from the upper strata.

The cement plug left in the bottom of the casing is then drilled out and drilling is resumed with a new bit of slightly smaller diameter than the inside of the casing. As the well deepens it is necessary to insert new strings of casing, which extend from the top of the well so that the various lengths resemble a telescope with the eye-piece at the bottom. In a typical casing programme of a fairly deep well there would be 16-in. diameter casing down to 500 ft., 11-in. to 4,000 ft., 8-in. to 7,000 ft. and 6-in. to completion. A well drilled in California recently was completed with a 3½-in. bit at a depth of 17,754 ft.!

Drilling of course is often beset by many problems. Certain rock formations have a tendency to cave, or squeeze into the well and interfere with drilling. Caving can sometimes be prevented by the use of special drilling mud, but in some cases it is necessary to plug the cave with cement and to re-drill. Sometimes part of the drilling string comes adrift, but usually this can be recovered by the use of special "fishing" tools. If it cannot be recovered it may (Continued on page 334)



Unscrewing a drillpipe during drilling operations in Iran.

Lockheed's "Shooting Star"

By John W. R. Taylor

SIX and a half years ago, a sleek green jet fighter roared low over the Mojave Desert in California, banked steeply and swept in to a fast but perfect landing. It was not the first jet 'plane built in America; but it *was* the first to show any promise as a fighter fit to engage Germany's new and dangerous twin-jet Messerschmitts; so the small group of Lockheed Aircraft engineers and Air Force officers who had just watched its first flight had every reason for their mixed feelings of excitement and relief. Further test flights confirmed first impressions of its quality, and it was put into production as the P-80 "Shooting Star." Since then more than 1,400 "Shooting Stars" have been built by Lockheeds, and the basic type is still in production for day and night fighting, photo-reconnaissance and training duties.

Behind the success of this fine fighter, which forms the subject of this month's cover picture, lies a story of enterprise and achievement more thrilling than any Hollywood aviation "epic."

Lockheeds had started toying with the idea of building a jet fighter in 1939, and actually got as far as drawing up a very advanced design, powered by an engine of their own conception. But when they asked the U.S. War Department for some money to build it, they were told that, with war imminent, the U.S.A.A.F. needed lots of piston-engined 'planes rather than a few jets which might or might not work.

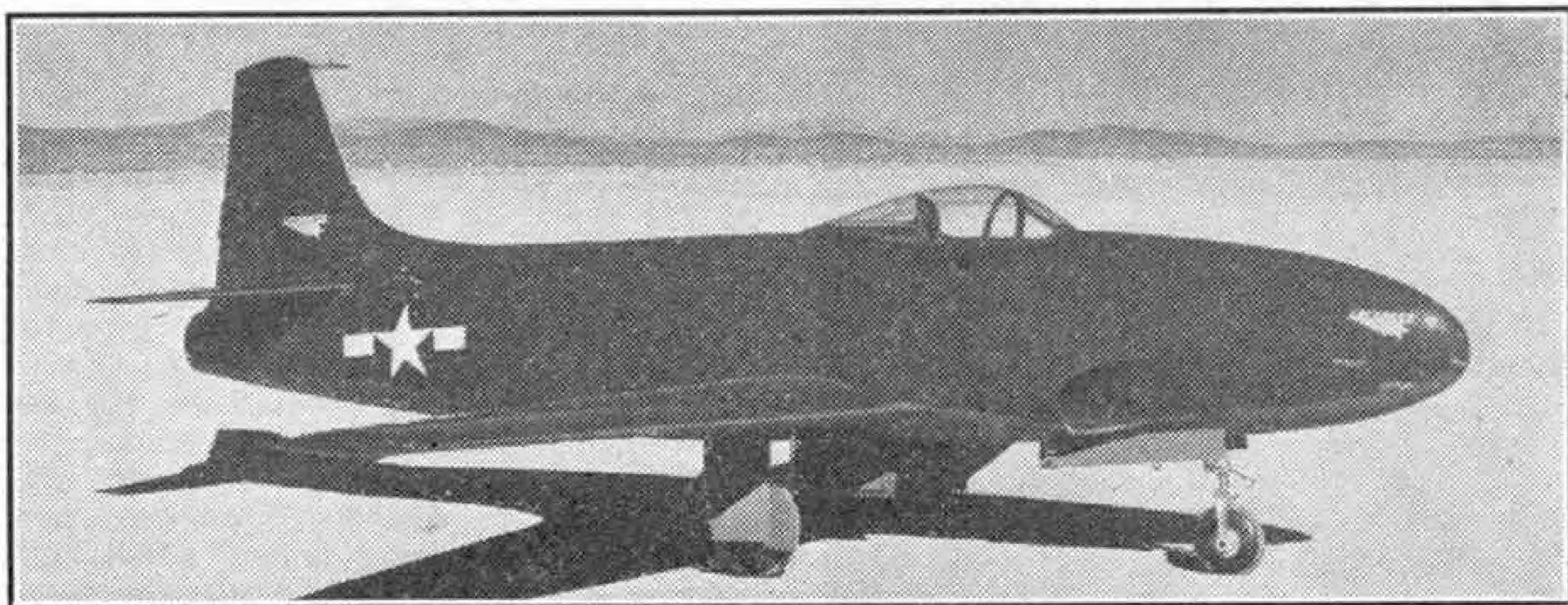
By the Summer of 1943 the position was very different. Persistent rumours of

spectacular new jets being developed in Germany had got U.S.A.A.F. experts worried. The British had already flown the prototype "Meteor," powered by two "Halford" H.1 jet engines (forerunners of the famous de Havilland "Goblin"). All that the U.S.A.A.F. had was the twin-jet Bell "Airacomet," which was little faster than piston-engined fighters. Consequently, when Lockheed's chief engineer, Clarence "Kelly" Johnson, offered to design a new jet fighter round the British 2,500 lb. thrust Halford engine, the U.S.A.A.F. did not this time quibble over the cost.

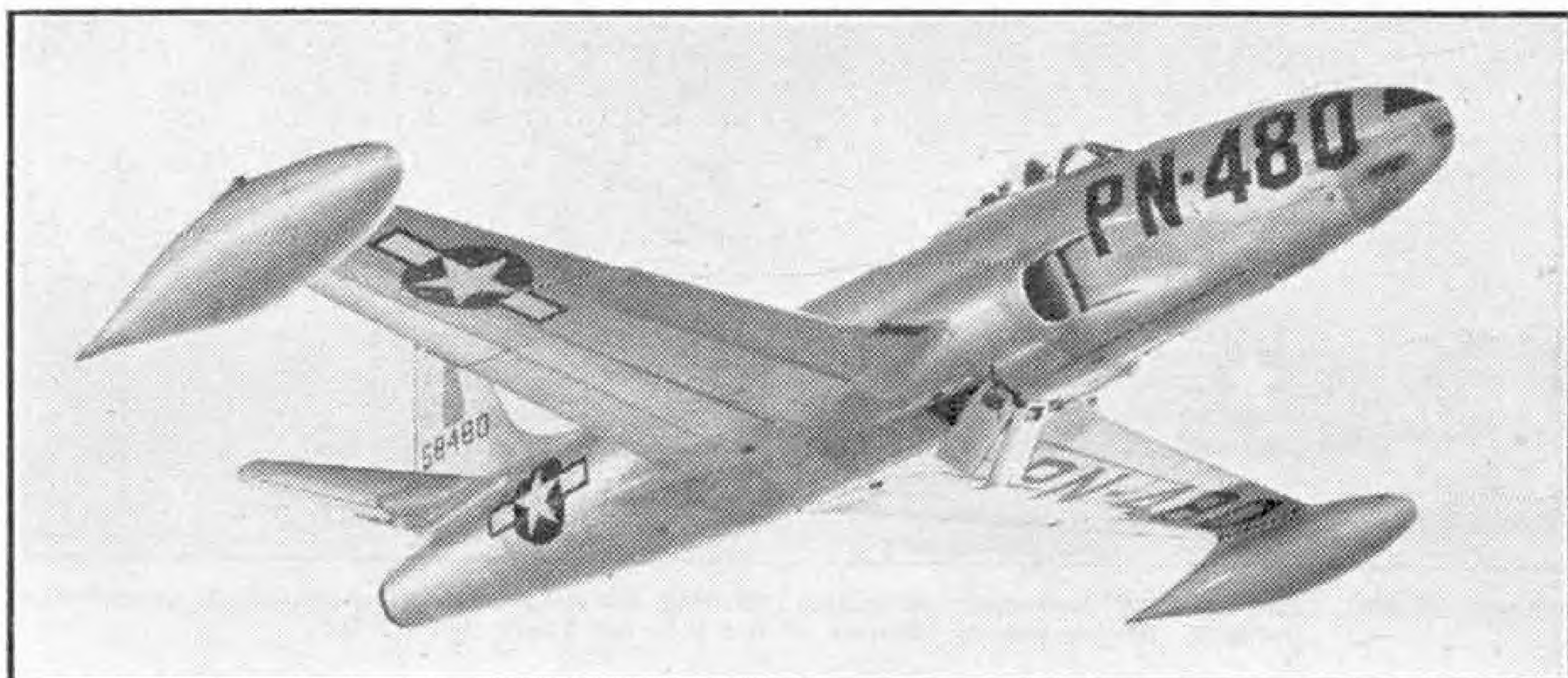
The story of the "Shooting Star" began in the best Hollywood tradition, for Johnson made his preliminary sketches on the back of an envelope, aboard the air liner which carried him back to Lockheed's Californian factory. Next day, however, he got down to the job properly on a drawing board. Within a week he was at the U.S.A.A.F.'s experimental base at Wright Field, complete with drawings of his projected fighter, and detailed notes on its equipment and estimated performance. "What's more," he added, "we'll build it in 180 days."

Two hours later he was handed a provisional contract and told to get busy as it was "Day No. 1."

Although both the Air Force and Lockheed's President, Robert E. Gross, gave Johnson a completely free hand to get the aircraft finished on time, things went far from smoothly. None of the existing factory space could be spared so he had to start by building his own



The prototype XP-80—the first "Shooting Star" jet fighter, powered by 2,500 lb. thrust "Halford" H.1 (British) engine. The photographs on this and the next page are by courtesy of the Lockheed Aircraft Corporation, U.S.A.



The Lockheed F-80B "Shooting Star," seen here with unpainted, shiny aluminium surface, incorporated many improvements over the P-80A, including faster firing guns and increased take-off and climb performance.

"experimental shop." As Britain was not the only country where building materials were in short supply at that time, his "shop" eventually consisted of a shed knocked together from old engine crates, scrap lumber and canvas.

Instead of running things from his office desk, Johnson donned a pair of overalls and set to work in this shed ten hours a day, seven days a week, with a staff of three assistants, 23 draughtsmen and 105 mechanics, only five of whom knew that they were going to build a jet fighter.

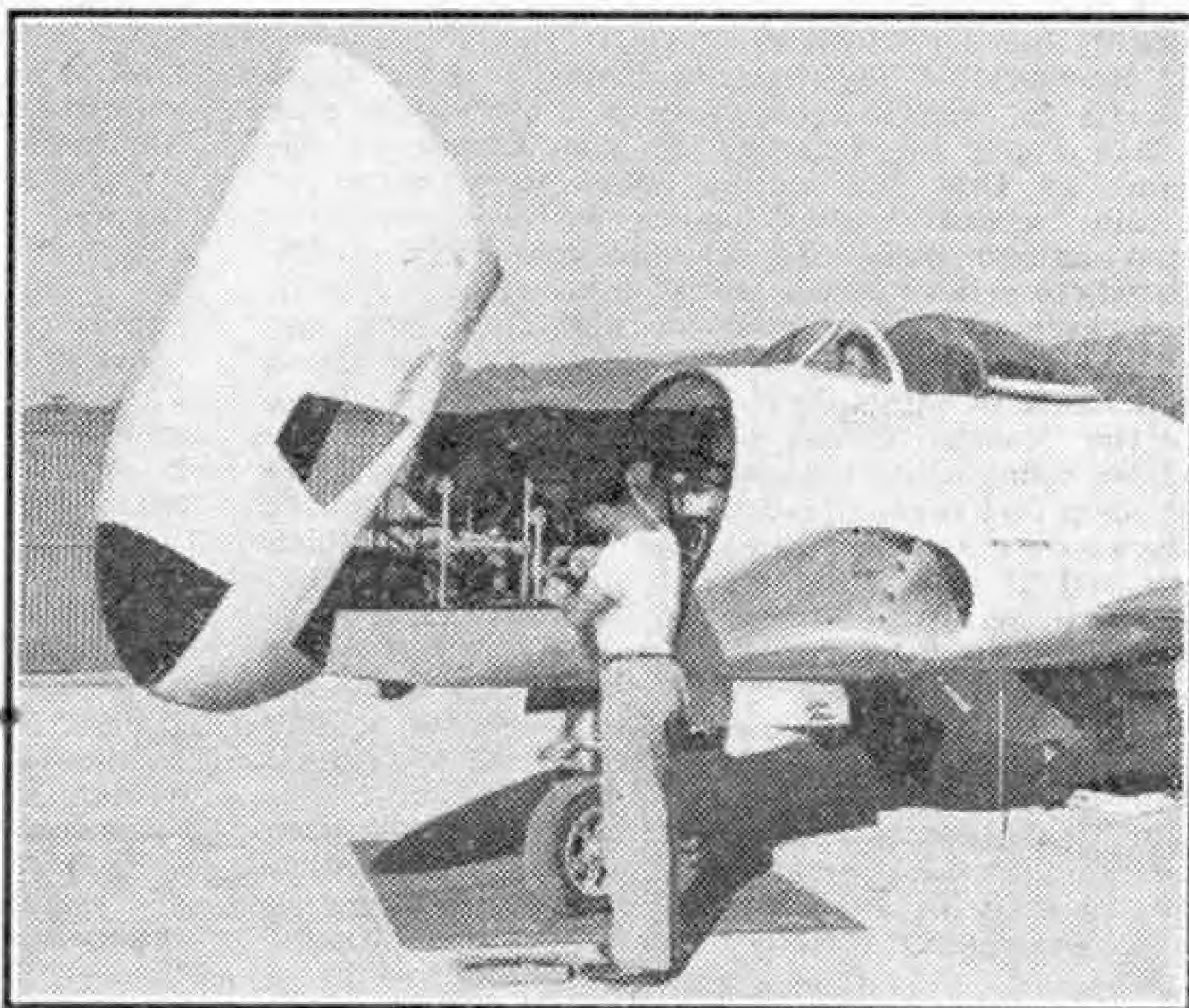
After only 19 days a full-size wooden mock-up had been completed and approved by the U.S.A.A.F., and then work on the real machine started in earnest. A board at one end of the shed proclaimed in large red letters: "Our days are numbered. This is day No. 20, 160 to go." As the second figure grew smaller, so the XP-80 took shape. At length, after only 130 days, the "Shooting Star" was nearly finished, but the promised engine had not arrived!

The U.S. Army Transport Command saved the situation by flying over a "Halford" engine from England, complete with a British engineer to supervise its installation in the "Shooting Star." Then the fun started.

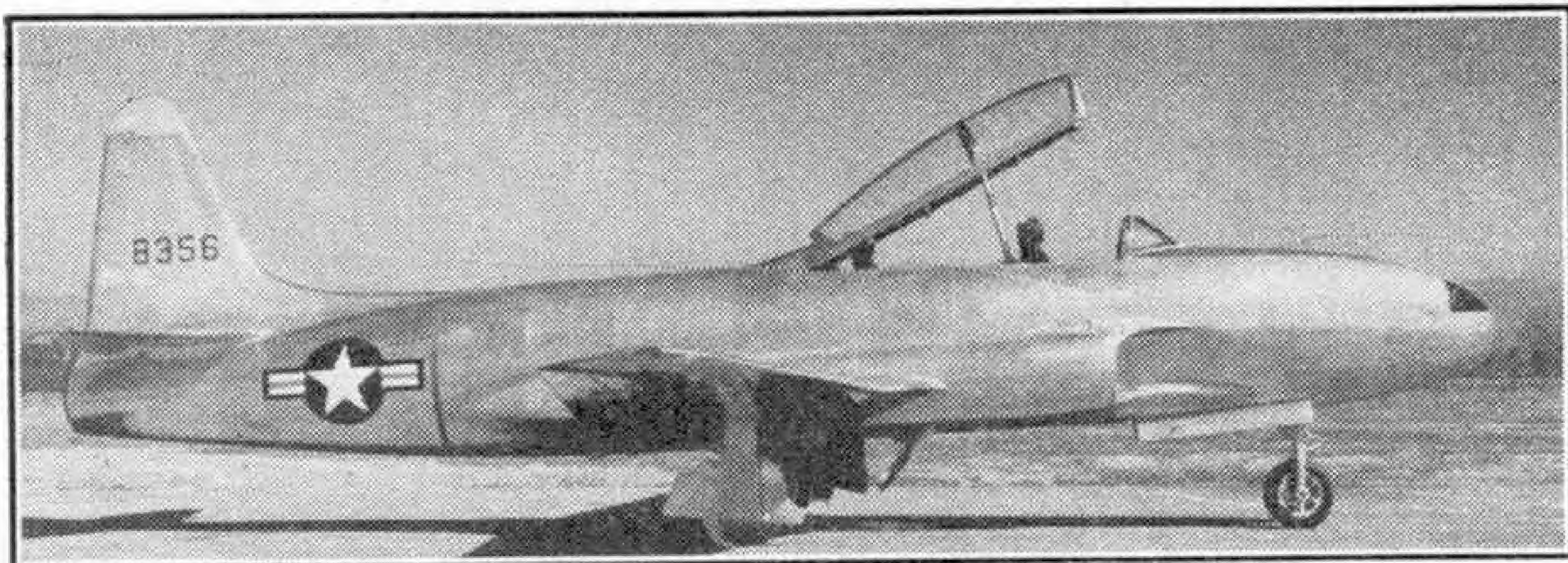
Exhausted after his 6,000-mile flight, the engineer had decided on a short rest in his hotel before starting work. Hours later, there was still no sign of him at the factory, and Johnson

began to get impatient. A telephone call to the hotel confirmed his worst fears, for no British technician had signed in there. After much anxious telephoning, he was traced to a cell in the local gaol. He had, apparently, been asked by a policeman for his military service "draft" card and, being unable to produce one or a passport to bear out his claim to be British, he had been locked up.

When the police rang Lockheeds to check up his story, the latter denied all knowledge of "Shooting Stars" or British engineers, for only Johnson's small staff knew of the hush-hush project in the ramshackle shed. No power on earth could persuade the police to relinquish



Servicing the cameras in the nose of a Lockheed RF-80—the photo-reconnaissance version of the "Shooting Star."



Lockheed TF-80C "Shooting Star" two-seater jet trainer, showing the longer fuselage necessary to provide two cockpits. Photograph by courtesy of the U.S. Air Force. Wash., D.C.

their hold on him after that, so he spent the night in his cell.

Fortunately, the episode seems to have had no ill-effects on Anglo-American goodwill, for within a week the "Halford" engine was safely inside the airframe and ready for its first test run. But Johnson's worries were not quite over, as in the haste to get his workshop built he had forgotten mere details like a doorway through which to get the aircraft out. So the whole shed had to be torn down before the machine could be moved!

It was flown for the first time on 9th January, 1944, at Muroc Dry Lake, by the late Milo Burcham, 143 days after the U.S.A.A.F. had given Johnson the "go-ahead." Unfortunately, de Havillands had not at that time built up a big enough assembly line of "Halford" ("Goblin") jet engines to keep up with planned large-scale production of the "Shooting Star," so the aircraft had to be redesigned to take the American General Electric (Allison) J-33 engine. Among other things, the prototype J-33-powered XP-80A had to have a longer fuselage, 25 per cent. greater design weight, new air intake ducts, engine installation and equipment. It was, nevertheless, built in 138 days, closely followed by a service test batch of YP-80As.

The type soon went into large-scale production, first as the P-80A and then as the F-80A, when the U.S.A.A.F. decided to change its designation of "P" (Pursuit) to "F" (Fighter).

It incorporated many novel features, quite apart from its jet engine. For example, its entire rear fuselage could be detached to give access to the engine, so that the engine could be changed in 20 min. against several hours for a comparable piston-engined 'plane. Its ailerons were hydraulically boosted, to relieve strain on the pilot at high speeds. Its cockpit was pressurised for high-altitude flying, and fuselage dive brakes were fitted to slow down the aircraft in steep dives and so prevent its flying into the "compressibility shock-wave" range.

Other refinements followed, including the characteristic drop fuel tanks fitted at its wing-tips to improve endurance—always a sore point with jets, which burn fuel at an alarming rate. Later, all the radio and radar aeriels were built in flush with the skin, as reported in *"Air News"* last March. The result was an aircraft which quickly endeared itself to pilots and ground crews alike, although for a long time the short life between overhauls of its engine was a drawback.

The "Shooting Star" was just too late to be used operationally during the war, although two were flown in Italy in 1944 to see how they behaved in the Mediterranean climate. Later one was brought to England and re-designed to accommodate a Rolls-Royce "Nene" engine, which develops much more power than the usual J-33.

But the type was not seen over here in large numbers until some time after the war, when the

U.S.A.F. (no longer the *Army* Air Force) re-equipped parts of its occupation air force in Germany with jets. Since then they have become a familiar sight in our skies, having taken part in Battle of Britain Day fly-pasts over London and in several Fighter Command air exercises, as well as making the first West-to-East flight by jets across the Atlantic, from the United States to England.

Meanwhile, the basic design has been steadily developed by Lockheeds to improve performance serviceability and efficiency. Outstanding proof of their success was given in July 1947, when a specially-cleaned up "Shooting Star," designated the P-80R and fitted with a more powerful "Allison" engine, beat by 7 m.p.h. the World's Absolute Speed Record set up nine months earlier by a British "Meteor," with a speed of 623.8 m.p.h. at Muroc. It was the first time for 24 years that America had held this record, so Lockheeds had every reason to feel pleased with themselves. The "Shooting Star" had come a long way since the prototype flew over the same stretch of desert some 3½ years earlier.

It has gone further still since then, both in design and development and physically, for "Shooting Stars" are in service in large numbers in the United States, Panama, Europe and Japan. The F-80A was first superseded by the F-80B, with a thinner wing, water-alcohol injection to boost engine power in emergencies, rocket launchers under the wings and a strengthened nose to permit greater fire-power. This, in turn, was followed by the F-80C, with a more powerful engine, developed from the "Allison" Model 400 which powered the record-breaking P-80R.

Quite early in its career the "Shooting Star" was adapted for photo-reconnaissance, its high speed of about 600 m.p.h. making it ideal for the job. In this form it has a longer and blunter nose than the fighter type, in which are fitted a number of aerial cameras in place of the normal guns and ammunition. This PR version, which was first designated XF-14 and XF-14A, but is now known as the RF-80A, B or C, can be quickly identified by the camera windows at the side and under its nose.

Then came two jet-trainers—the T0-1 built for the U.S. Navy, which was basically the same as the F-80B, and the U.S.A.F.'s two-seat TF-80C, complete with a longer nose to house a second pilot behind the usual fighter cockpit.

From this TF-80C has now been developed the formidable F-94 "Shooting Star" two-seat all-weather fighter, which was described in the November 1949 *"Air News."*

That is as far as we are allowed to take the story at present, but Lockheeds have already used experience gained with the "Shooting Star" to produce their striking new XF-90 penetration jet fighter. That does not mean that we have seen the last of the F-80, for there is plenty of "stretch" in its basic design, and we may yet see powerful new versions of this versatile aircraft.

Lineside Adventures with a Camera

By H. Gordon Tidey

FOR more years than I now care to remember it has been my custom to devote a week or so in the summer to a tour devoted entirely to railway photography. On some occasions I make a headquarters of a busy spot, having "days out" on the surrounding lines; on others I spend a few days at one place and then transfer elsewhere.

Although last summer gave us such a generous measure of sunshine, particularly in the south of England, I struck a bad week on my visit to Berwick where I began operations, both days being wet, as were several more at Newcastle. For the remainder of the time there was nothing but heavy clouds, with entire absence of sun, although unbroken sun-

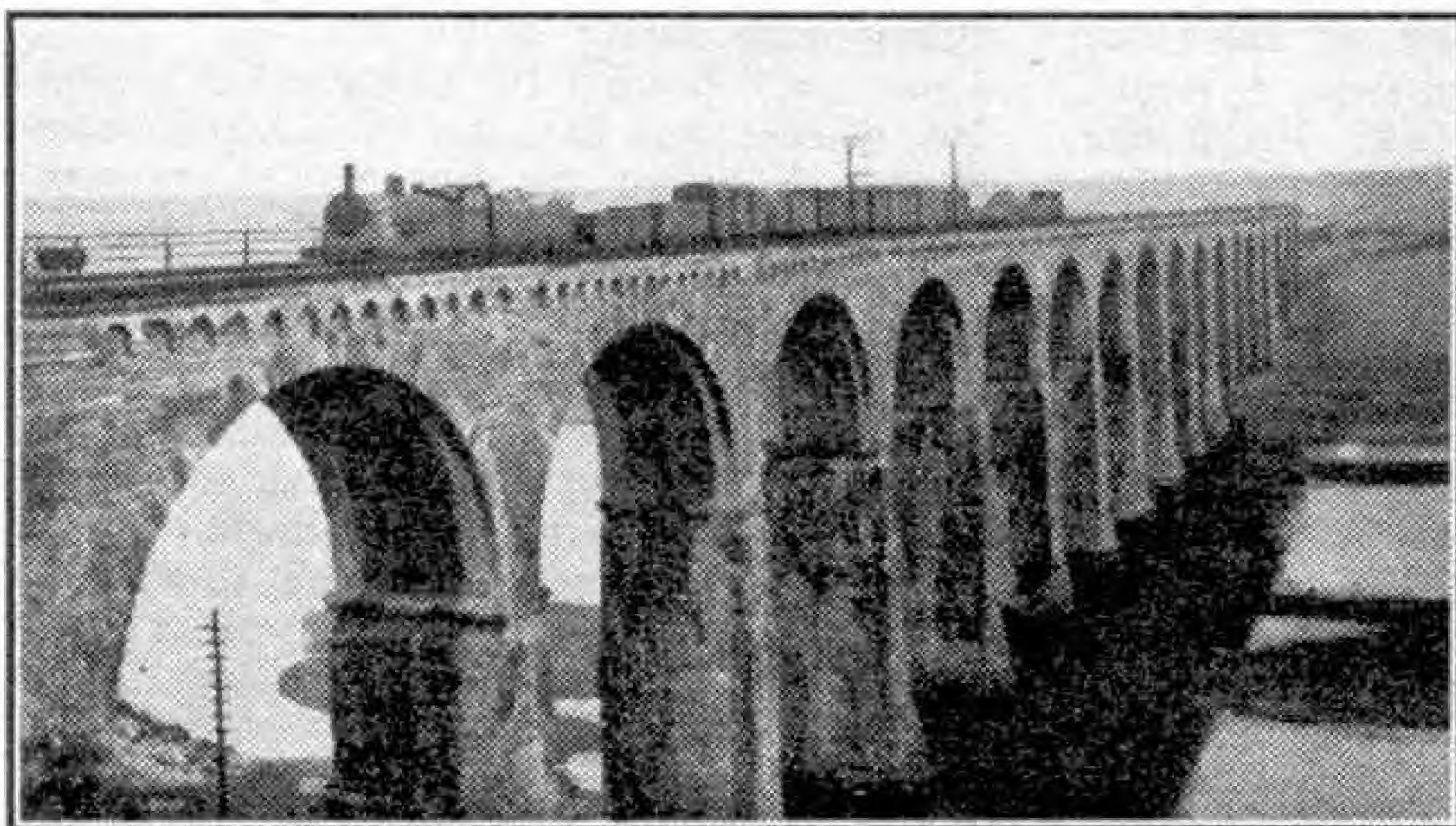
periods during which everything appears to go to sleep. And at least during the day the tedium is not even relieved by the passage of many through goods trains. Curiously enough I noticed that the latter appeared to be almost exclusively worked by express passenger engines of all the "A" classes; not, as one would expect by 2-6-2 "Green Arrows" or 2-6-0s.

At Berwick one does of course get a sight of the crack Scottish expresses such as the "*Capitals Limited*," "*Flying Scotsman*" and "*Queen of Scots*." They make an impressive picture coming across the Royal Border Bridge from Tweedmouth, an excellent view being obtainable from either side.

By dint of keeping the cap on the lens until the last moment, to avoid rainspots, I managed to "shoot" each of these in both directions, on both days, and in different positions. Having finished with Berwick, I boarded the 4.38 p.m. semi-fast for Newcastle, arriving there at 6.29 p.m. behind the A4 No. 60033 "*Seagull*." The following morning, the sun again being absent, I was once more restricted to slowly moving trains. Having

been at Newcastle on a previous occasion on which I had pretty well covered the photographic possibilities at the actual station, I decided to walk down to the King Edward VII Bridge which carries the railway across the Tyne.

The bridge is distinguished by the interesting fact that part of it is in the County of Durham and the remainder in Northumberland. The quarter-mile journey from the station to this bridge is anything but a pleasant experience owing to the fact that the busy up slow road runs so close to the boundary wall. I found myself wondering what would happen if an injector "misfired," or a hefty lump of coal or machinery descended on my head from a passing wagon!

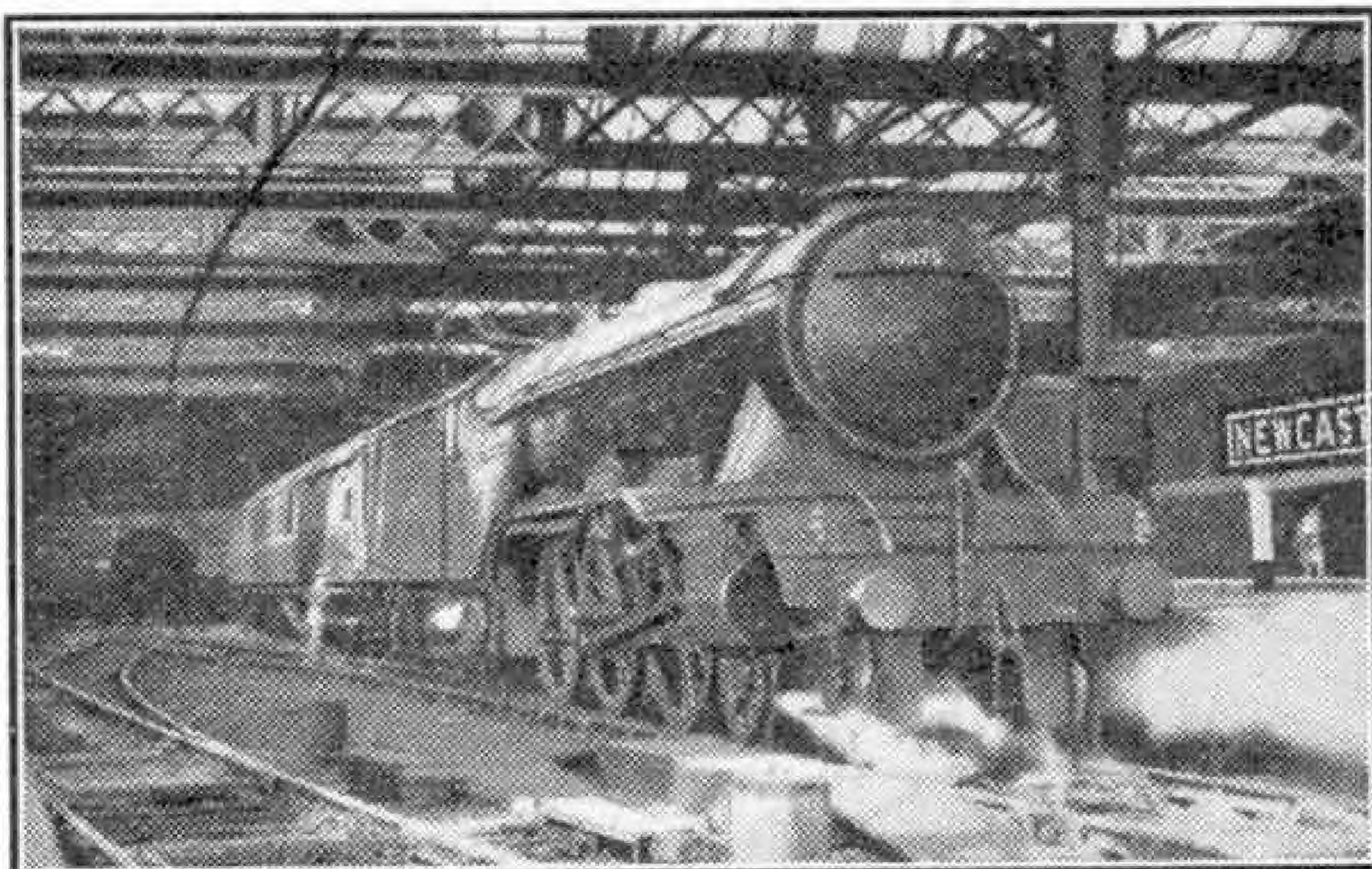


The Royal Border Bridge at Berwick. A freight train trundles across in charge of a North Eastern 0-6-0.

shine continued in the south. I was therefore restricted to photographing slowly moving trains and using comparatively long exposures.

On arrival at Berwick, not wishing to waste a glorious sunny evening, I just dumped my luggage and rushed straight back to the station in time to obtain shots of the down "*Queen of Scots*" and several goods trains. Under the circumstances it was well that I did not waste the evening; I didn't see the sun there again!

Despite the rain, the following morning saw me at the station. I speedily awoke to the fact that, although Berwick is actually on the East Coast main line to the extreme north, there are considerable



The "plum and spilt milk" Leeds-Glasgow express standing at Newcastle (Central). The engine is No. 60075 "St. Frusquin," of class A3.

However, having arrived safely I was successful in obtaining a number of quite satisfactory shots. The opportunities here were many times multiplied when compared with the comparative quiet of Berwick.

As I reached the chosen spot, I found the down slow signal was off. From the shed at Gateshead, just across the bridge came A3 class "Hyperion" and A2/3 "Bronzino" coupled together, both discharging clouds of smoke and proceeding to the station to pick up their trains. Meanwhile the down fast and up slow signals were now both off, and I speculated as to whether the up slow would get out of my way in time to allow me a shot of the down fast. Yes, it would just clear, though being a heavy goods hauled by a late N.E.R. 4-6-0 it was proceeding in a very leisurely manner.

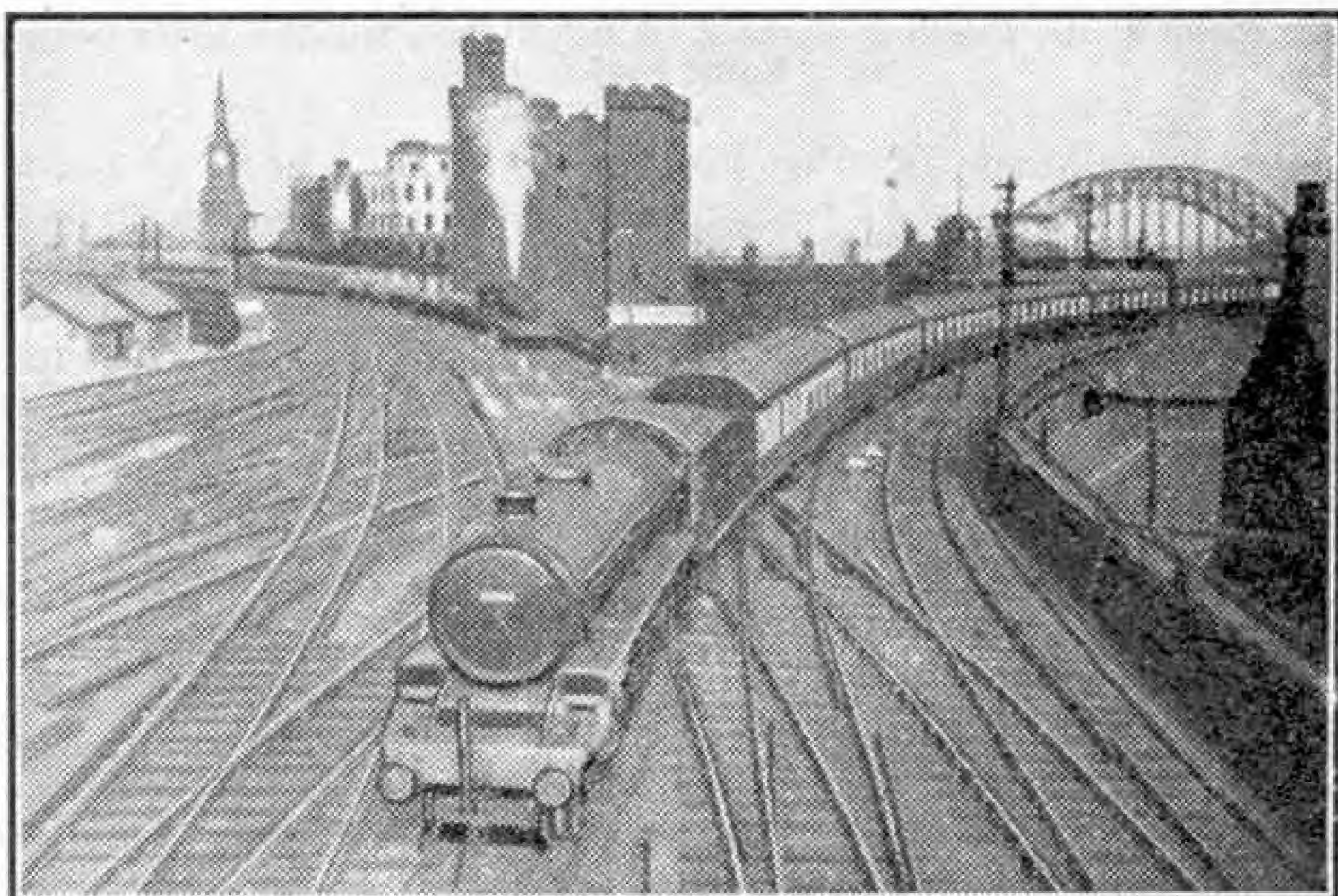
I was just in time to get the Leeds-Glasgow in experimental "plum and spilt milk" with blue-painted A3 "Gainsborough," the whole effect being very reminiscent to me of the days when I used to see the "West Coast Corridor" on the Caledonian, hauled by the then mighty 4-6-0 "Cardean!" This Leeds-Glasgow train arrives at Newcastle about 11 a.m. and at the time was always worked by one of the several blue-painted A3s. Incidentally, uniformity of painting did not appear to have been reached by any means. I saw at

least six A3s painted blue, various B1s were still green also several V tanks; and one little shunter beautifully lined out and spotless, presented a notable contrast to her grimy sisters about the station.

Musing on these matters I was only just in time to catch the up "Capitals Limited," a recent addition that has usurped the place of honour occupied for so many years by "The Flying Scotsman." It thundered past in charge of A4 "Walter Wigham" just in time to clear three light engines proceeding to the shed on

the up slow road. These were a 4-6-0T and an 0-6-0 of late N.E.R. origin, and a B1 4-6-0.

Now the up main line signal went off again, and along came the up "Flying Scotsman," hauled by unnamed A1 4-6-2 No. 60124; this had hardly cleared before it was followed up by the "Norseman" in charge of A2 No. 60538 "Velocity." Immediately afterwards came a Leeds excursion and this time the engine was a "Green Arrow" No. 60835, "The Green Howard," evidently fresh from the paint shops; in contrast to most of these V2s it was possible to read the number on the cab side! Meanwhile on the down fast there passed a "piped" express fruit hauled by A4 No. 60023 "Golden Eagle." Each one of those caused the whole bridge to vibrate to such an extent that I wondered



A B1 4-6-0 entering Newcastle with a Liverpool express. A freight train waits in the background.

whether in the event of a complete collapse into the River Tyne, it would be possible to save the camera (with contents) as well as oneself!

Newcastle as a railway centre is exceedingly interesting. In addition to being an important junction it is the terminal point of the Tyneside Electrics serving the North-umberland coastal and inland towns by a complicated system of connecting lines.

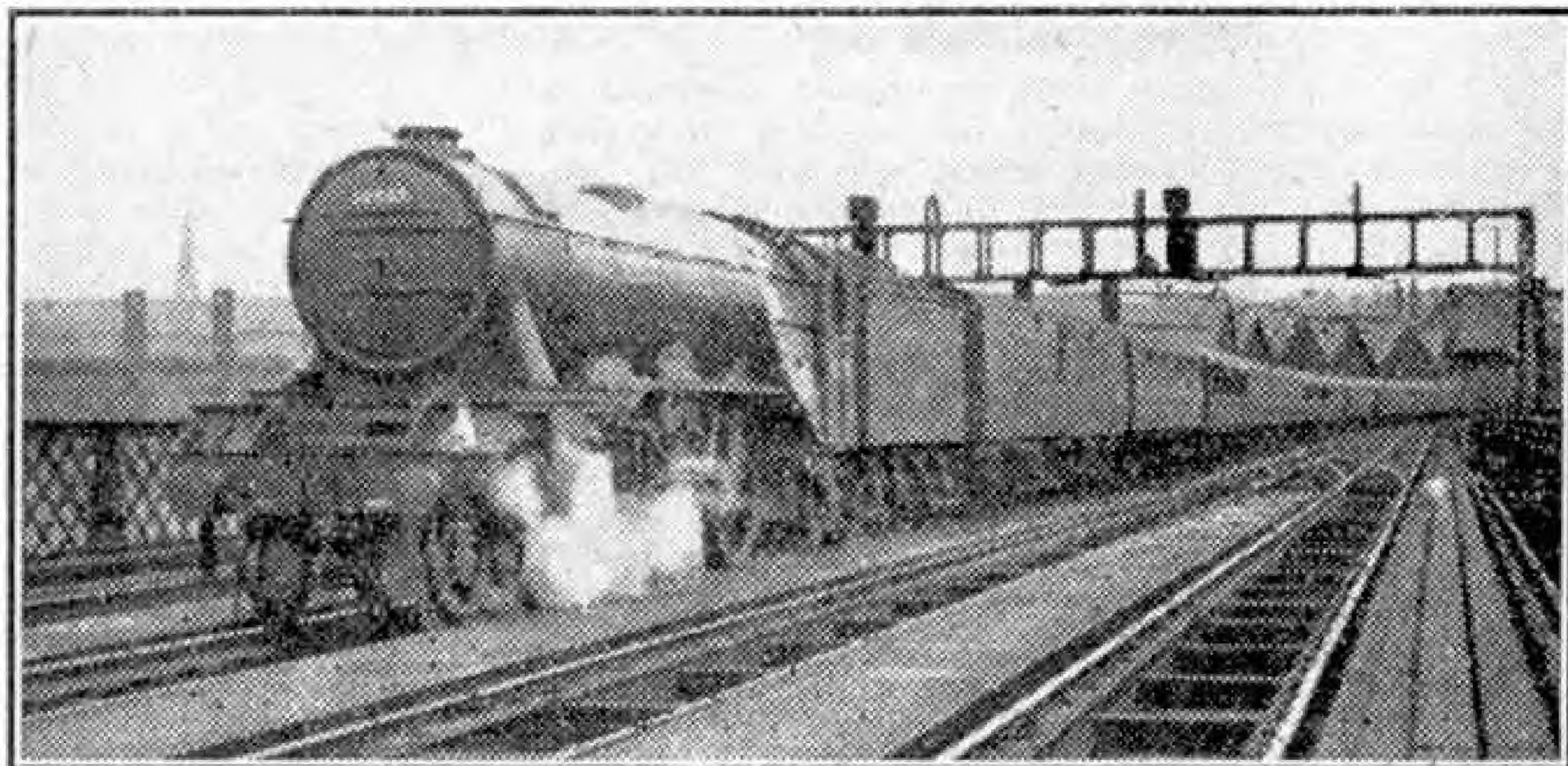
The station itself lies east and west, and the main line to London on leaving the western end immediately takes the sharp curve to the south and crosses the River Tyne by the King Edward VII

Bridge. Gateshead shed, from and to which there is a frequent passage of light engines, is situated near the southern end. One sees all classes of passenger and freight engines, many of North Eastern origin, as well as a few of North British.

The cross-country line to Carlisle also leaves from the western end of the station, branching west shortly before the bridge. The bulk of the trains on this line were at the time worked by class "B1" 4-6-0s, or occasionally by a 4-4-0 of late North British or North Eastern design. Tank engines of all classes were plentiful, all being late N.E. types with the exception of the Gresley 2-6-2s.

Having had a busy morning, I set out again for the return journey to the station, squeezing myself against the wall for

the passage of a coal train. I then studied the amusing spectacle of a shunting engine endeavouring to refill its water tanks from a crane which had its leather feed pipe cut away to accommodate the high tenders now in use. So the



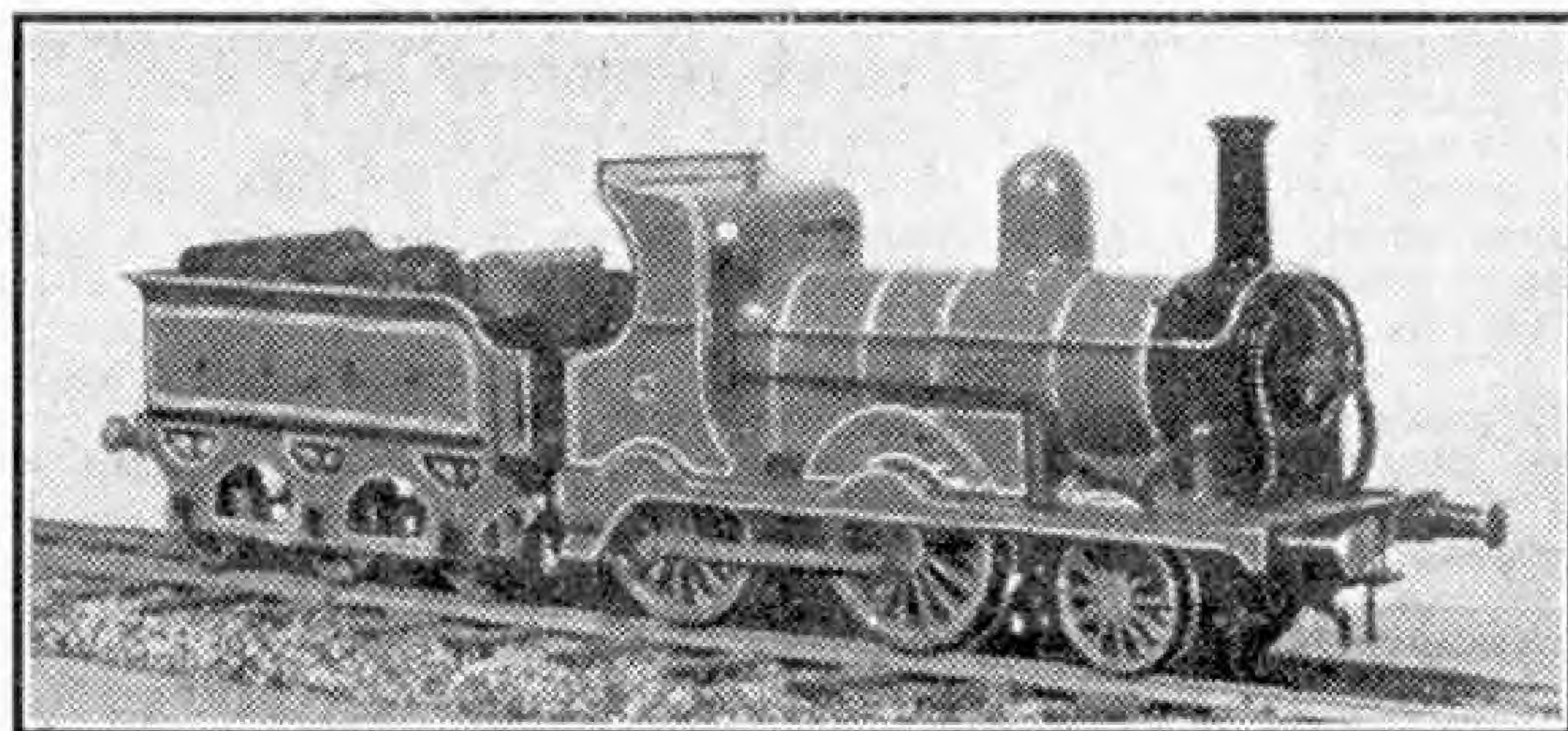
B.R. 4-6-2 No. 60083 "Sir Hugo" of class A3 heads across the King Edward VII Bridge at Newcastle with a London express.

end of the pipe was some four feet above the tank engine's filler hole, necessitating some surprising acrobatics on the part of the fireman, who was standing on top of the tank making desperate efforts to hit the filler hole without saturating himself, the driver and everybody and thing within reach.

Taken altogether, and despite the unsuitable weather, I had a most interesting and enjoyable trip. When Thursday morning came my regret at returning home was tempered by anticipation of the enjoyable and lengthy journey. Above all there was the excitement and pleasure of developing my results, some of which you see here, always so eagerly anticipated and bringing back vivid memories of a holiday so pleasurably spent.

An Irish 2-4-0 Model

The gauge "0" Irish International Railway and Tramway system operated by



Mr. C. L. Fry of Dublin, forms a veritable museum of Irish Transport, for historic as well as modern models are included.

A model locomotive representative of the middle period of railway development is No. 13, "Rapid," a 2-4-0 of the former Midland Great Western Railway. It includes almost every external detail found on the real engine in its original state.

The shape of the cab is remarkable, but it follows exactly the lines of the prototype; and the front vacuum brake pipe curves round to the top of the smoke-box.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"THE YOUNG CRICKETER"

(Naldrett Press. 10/6 net)

Here is an admirable book on cricket, designed in the main for young players but capable of giving pleasure to every cricket lover, whatever his age. Its pages have been written by leading players and coaches, but it is far more than a mere book on how to play cricket. It has been prepared in close collaboration with members of the M.C.C. Cricket Enquiry, the purpose of which is to find out how more boys and girls can be given a chance to learn the game and excel at it, and the royalties will be devoted to this crusade for youth. The English Schools Cricket Association will receive half the proceeds to enable them to widen the scope of the work they are undertaking on behalf of school cricket.

Each article in the book has the full approval of the M.C.C. The foreword has been written by H.R.H. The Duke of Edinburgh, K.G., President of the M.C.C., and Mr. H. S. Altham, Chairman of the Cricket Enquiry, explains something of what it is hoped the book will do.

Turning now to the contents, we begin with a delightful article by Sir Pelham Warner on Lords, the home of the M.C.C. and indeed of cricket itself. Next we have articles by such famous players as Denis Compton, Cyril Washbrook, Godfrey Evans, F. R. Brown, Trevor Bailey and L. Constantine, each of whom deals with some aspect of the game at which he is a master. What they have to say will be read with eager interest, not only by boys wishing to learn, but also by many hardened cricketers. Then we have stories of the great men of cricket and of famous games by well known writers, and articles on the pitch, bat making, umpiring, schoolboy feats and single wicket games. By way of contrast we have pictures from the only film ever made showing the old master W.G. in action, and the story of the rise to fame of Brian Close, the youngest cricketer who ever played for England.

In addition there are lighter contributions, including cricket yarns, a puzzle story and an interesting section on cricket in books. Finally comes the Cricketer's Log, giving details of performances in the 1949 season, which was distinguished by the presence in this country of the New Zealand team under W. A. Hadlee.

The book is splendidly illustrated and includes many excellent plans and diagrams, all of a most helpful and informative kind.

"THE ABC OF LONDON TRANSPORT"

By S. L. POOLE

"LONDON'S BUSES ILLUSTRATED"

(Ian Allan. 2/- each)

The title of Mr. Poole's book is sufficient indication of the scope of its contents. It deals with London Transport buses and coaches in the usual "ABC" manner. The classification of the various vehicles is dealt with, and stock numbers and registration letters of every bus at present in London Transport service are given, together with similar details of special service vehicles. Bus routes, garage codes, and a wealth of illustrations complete a useful handbook that the London bus spotter will regard as an essential part of his equipment.

The second book consists principally of a series of reproductions of London bus photographs, ranging from the solid-tyred and well-remembered "B" type to the modern "RTs," with brief notes on each bus pictured. An interesting foreword is contributed by O. J. Morris in his usual entertaining style, giving picturesque and often humorous details of earlier days of London transport.

"BRITISH STEAM HORSES"

By GEORGE DOW, A.M.Inst.T.
(Phoenix House 12 6)

This is one of the few books on locomotives written by a professional railwayman, and in it the author shows that there is still something fresh that can be written about steam locomotives and our railway system. Into its pages Mr. Dow has packed an enormous amount of diverse and fascinating information. The story is well written, reliable and comprehensive in so far as facts and figures are concerned and made lively and interesting by its stories of famous locomotive designers and of speed and endurance records. Some of these anecdotes are here made public for the first time.

The design and layout of the steam locomotive is first explained, and the building of a modern engine is described. Passenger and freight locomotive types are considered at length in separate chapters, and a particularly interesting section deals in some detail with running shed work. An account of various steam locomotive speed and other records brings the text to an end. Appendices cover the renumbering of British locomotives under the British Railways regime, with notes on the standard liveries now being adopted and on the exchange trials that were carried out a couple of years ago.

The book has an excellent index, an admirable feature that will be found useful by the "locomotive enthusiasts of all ages" for whom the book is intended. A splendid selection of diagrams and photographs, many of the latter reproduced here for the first time, provides satisfying illustrations and these too are carefully listed.

"NETS"

By G. A. STEVEN

(Routledge and Kegan Paul. 5/- net)

Although much netting is now made by machinery there is room for a good book on the subject, and Mr. Steven has provided it. He obtained his first knowledge of fishing and seamanship in his native village in Caithness, and has been adding to it ever since. He is now constantly engaged in research with special reference to fish and fisheries, and has a really practical knowledge of nets and netting.

Mr. Steven leads the beginner gently through the earlier technical details of nets and then explains step by step the various processes that must be gone through in order to make and shape them. Mending too is given careful consideration, and there are chapters on knots and hitches and on making string bags for tennis balls, shopping bags, a garden hammock and other articles in which netting plays a part. Finally comes a section on the best way to preserve nets.

Ample use is made throughout of diagrams to illustrate both making and mending.

"YOUR FAVOURITE DOG"

By NINA SCOTT LANGLEY

(Brockhampton Press. 3/6 net)

This attractive little book is one of the "Young Naturalist" series issued by the Brockhampton Press and is remarkable for the large amount of useful information it gives in little space. In its 32 pages descriptions are given of 49 different breeds, grouped in sections as dogs for use, for sport and for championship and guard, and terriers. The text is accompanied by excellent drawings by the author, many of which show the various characteristics in attitude and will be a great help in the recognition of the different breeds. All dog lovers will enjoy this interesting booklet.

"THE GRESLEY PACIFICS OF THE L.N.E.R."

By CECIL J. ALLEN, M. Inst.T.
(Ian Allan. 8/6)

This book, No. 6 of the "Famous Locomotive Types" series, is considerably larger than its predecessors, consisting of 128 pages of informative text, photographic reproductions, and appendices covering the story of one of the most famous locomotive types of the present day. The story is an attractive one, full of detail, not only of the locomotives themselves, but also of their performance on the road. This is illustrated by descriptions of many runs, including the record-breaking feats of "Mallard" and others as well as every day achievements, and the book has the precision and interest for which Mr. Allen has established such a high reputation.

It is not often realised by present-day locomotive enthusiasts that the original Gresley "Pacific" design first took shape on the old G.N.R. in 1922, and that the original engine layout has survived through successive developments, first to the "Super-Pacifics" and then to the streamlined "A4" series introduced specially before the war for the running of high-speed trains. The different stages in the development of the design, the influence of the 1925 locomotive exchange with the G.W.R., and the various experiments conducted with individual engines all take their place in the story.

The extraordinary capacity of the Gresley engines for hard work and their long-distance, non-stop running between London and Edinburgh are amply illustrated, and the author comments on the stimulating effect of their competence on L.N.E.R. railway working. The amazing high-speed performances and records created by various engines of the streamlined series of course are given special attention. Finally, consideration is given to one of the most controversial items of Gresley "Pacific" design, the well-known conjugated motion whereby the piston valve of the inside cylinder derives its motion through a system of levers from the outside valve spindles.

The appendices list the numbers, names and classes of all the Gresley "Pacifics," with notes on individual engines. Leading dimensions of the various series and dimensioned drawings of each main class also are given, with diagrams showing the footplate details of the earlier right-hand drive engines and of the later ones with left-hand drive.

"THEY FOUGHT FOR BRIGANTIA"

By MARJORIE A. ROWLING (Harrap 7/6)

Our hero is the son of a Roman Legate, who when still a child was abducted by a British chieftain and brought up as a Briton under the name of Gwyn. He is quite unconscious of his origin and joins in schemes for freeing the country from the Roman yoke. The tribe with whom he has been brought up rises in rebellion, and in a great battle they are faced by a Roman army with Gwyn's father in command. By that time Gwyn had learned his own origin, and in the battle he saves his father after he has been struck down and left for dead.

The story will hold the attention of readers to the end. They will be interested too in the glimpses of the Britain of nearly 2,000 years ago, with its Roman forts and walls and with British tribesmen living their own lives outside the settled cities founded by the invaders.

"WOODWORK AND TOY MAKING"

By BENJAMIN T. RICHARDS (Bell. 6/- net)

Those in charge of toy-making groups, and indeed individual workers interested in work of this kind, will find in this book a wealth of advice based on experience that will help them to design articles capable of standing up to the hard wear they receive in the playtime of children. The book gives the usual explanations of woodworking tools, methods and materials, all nicely concise and practical, with good diagrams, and then gives profusely illustrated instructions for making pull-along animals, engines, lorries, scooters and dozens of other toys.

"LONDON'S DOUBLE DECK BUSES"

By JOHN C. GILLHAM (Ian Allan. 2/6)

This is a useful and detailed review, with many excellent illustrations, of the London Transport Double Deck Buses at present in service, and certain types not now in use. It does not aim at presenting a full history of the London bus, but it gives many interesting details of well-remembered types. Its appearance just now is particularly appropriate, for the double deck bus, as a type, celebrates its centenary this year, the first horse-drawn examples having made their appearance in 1850.

Road transport enthusiasts and the bus "spotter" will find much to interest them in the 49 pages that make up the book, and many bus users who would lay claim to being in these classes also will be attracted by it. An interesting feature for the beginner is the inclusion of detailed instructions on making the best use of the book.

There are good illustrations of each type of bus, and the fleet numbers of the different classes in use are given, together with the seating capacity, the make of chassis and body and so on. Brief references are made to the alterations and re-buildings that some of the classes have undergone during their career, and to the routes and services on which they appear, or have appeared.

The book concludes with an index to the running numbers of the classes concerned and a list of chassis, engine and body builders.

"MODERN LOCOMOTIVE CLASSES"

By BRIAN REED

(The Locomotive Publishing Company Ltd. 7/6)

The first edition of this excellent book appeared before our railways were nationalised, and the opportunity is now taken of issuing a new edition to place on record the locomotive position of Great Britain at the time when the former main line companies ended their careers. In it there are 64 large pages, measuring 11 in. by 8½ in., and a whole page is devoted to each of the locomotive classes dealt with. In each case there is an excellent half tone illustration at the head of the page, with a dimensioned drawing at the foot, and the space between is devoted to a concise but adequate account of the locomotive.

At the time when the railways were nationalised each of the four companies had found it both possible and desirable to concentrate on a dozen or even fewer standard classes. It is these that Mr. Reed deals with, in addition to other modern classes likely to give further useful service. To make the record complete there are also examples of Irish engines, various Ministry of Supply types, and a Hunslet flameproof, diesel-driven locomotive specially developed for mines service. The table of contents makes for ready reference, and the book should be a useful and authentic guide to all railway enthusiasts.

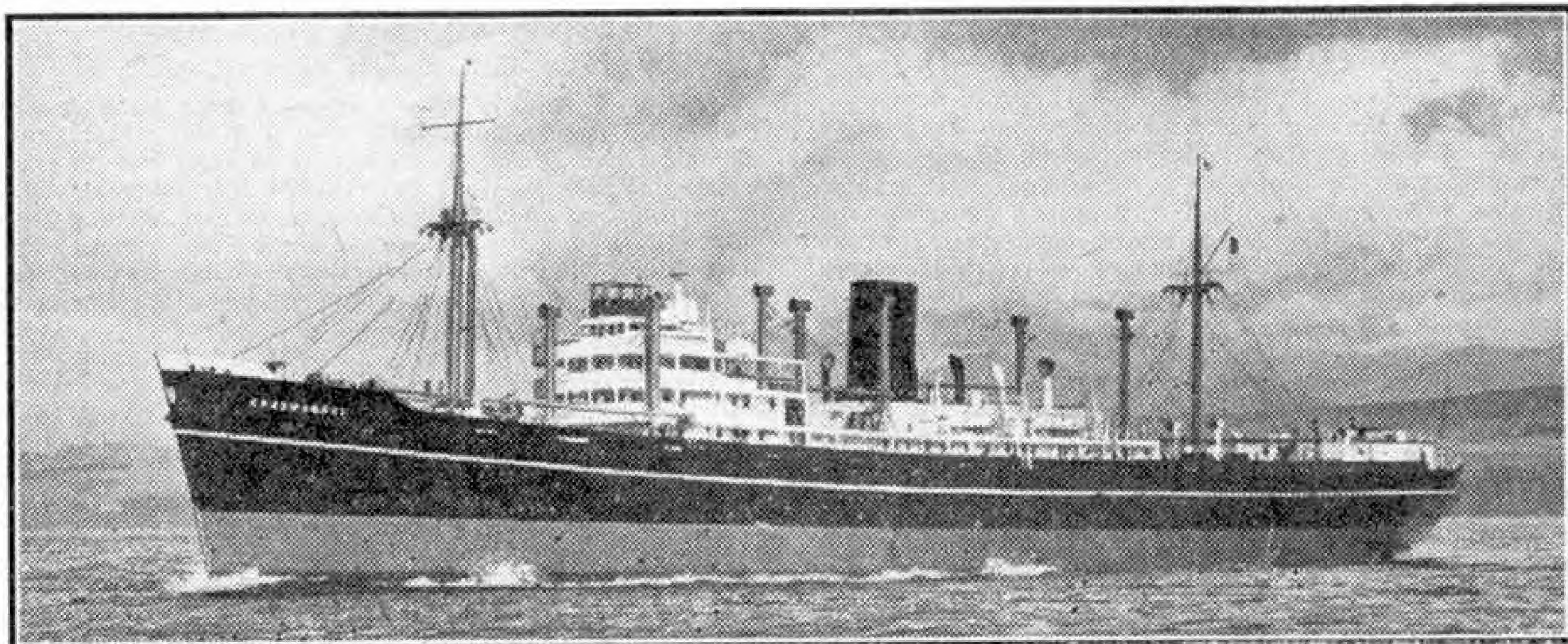
"MODEL RAILWAY CLOCKWORK MECHANISMS"

By ERNEST F. CARTER (Percival Marshall. 3/-)

Many miniature railway owners rely on clockwork locomotives for the movement of traffic on their systems, and a thorough knowledge of this form of motive power is a distinct advantage to the operator. Very little has been published on the topic in the past, and Mr. Carter's contribution is welcome. Owners of clockwork locomotives who wish to obtain the best results from a mixed collection of such engines cannot do better than follow the hints and suggestions he gives.

The book deals with the construction, performance, maintenance and repair of clockwork mechanisms, covering most of the types that the present-day locomotive owner is likely to encounter. Special attention is given to the need for free-running rolling stock, and the importance of avoiding friction in the locomotive mechanism itself is emphasised.

For illustrations there are useful sketches, and an appendix in the form of a table gives average performances of various types of clockwork mechanisms.



The P. and O. fast freighter "Coromandel." She was completed last Autumn for service on the London-Calcutta run. The illustrations to this article are reproduced by courtesy of the P. and O. Steam Navigation Co.

Fast Freight Ships of To-day

By Arthur Gaunt, F.R.G.S.

BRITISH-built merchant ships have long been the envy of many other nations, and to-day more than ever before our freighters are among the finest in the world. Since the end of the war, indeed, steps have been taken to build up faster and better fleets of British ships in this class.

The Far East in particular is now being served by a number of newly-built vessels that incorporate the latest ideas in ship-building and marine engineering. These ships replace some of those sunk during the war, or have been built to capture more of the Orient trade by providing the fastest service so far made available. While conditions in China have not enabled these new British fleets to operate as fully as their owners anticipated, the ships certainly merit admiration. Some of them are actually faster than many pre-war liners, and are equipped with cargo-handling machinery of advanced design. In addition to these new freighters, several of the pre-war Oriental vessels which survived the hostilities at sea have been entirely reconditioned and modernised.

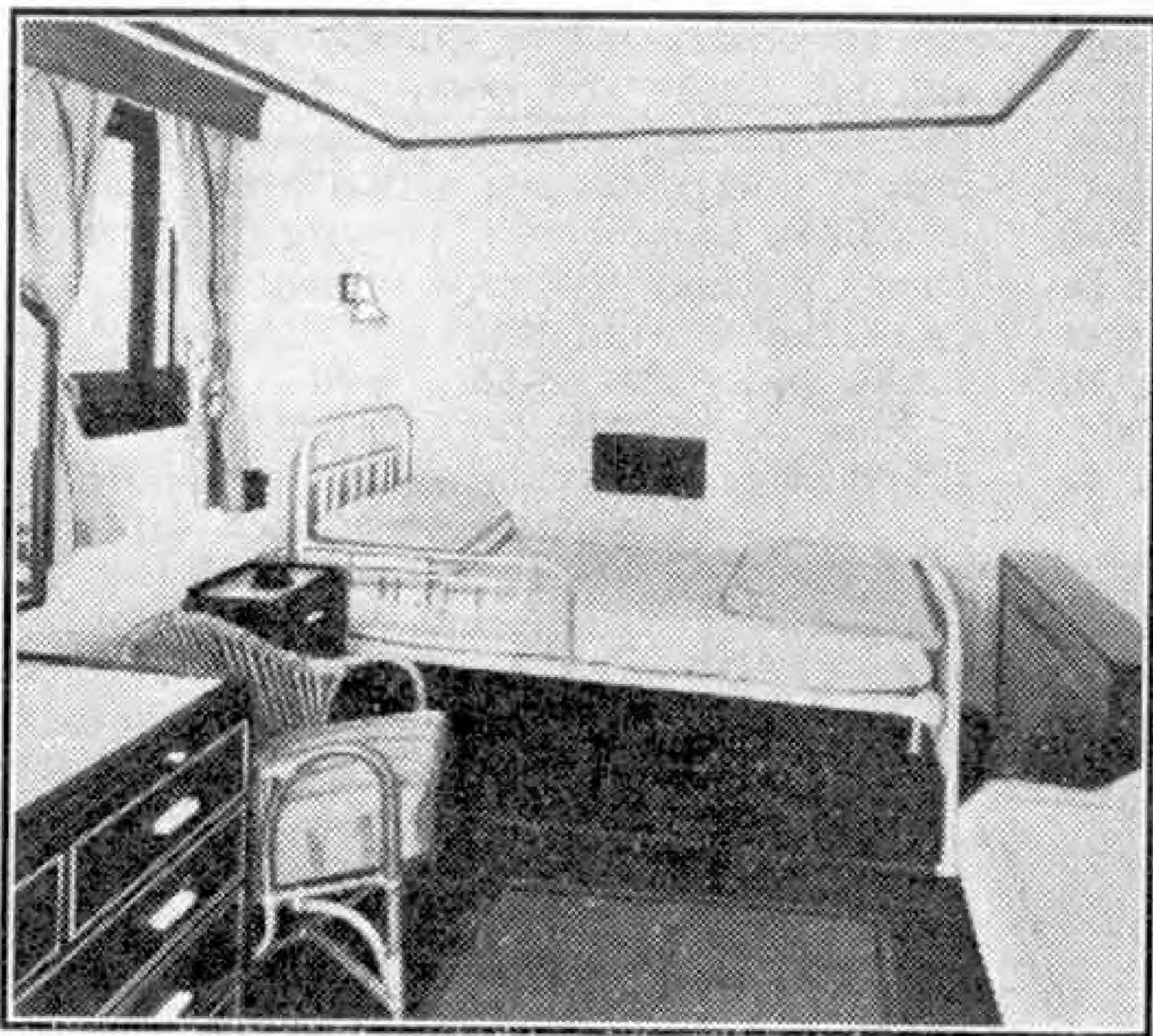
Four new 9,000-ton cargo liners have been put into service by the P. and O. Company since 1948 for carrying goods of various kinds between London and the Far East. Two of these ships, the "*Somali*" and the "*Soudan*," are motor ships, each propelled by two sets of opposed piston solid injection engines developing 13,600 b.h.p. The others, the "*Surat*" and the

"*Shillong*," are steamers, but all four are alike as regards dimensions and general appearance. The steamers, which are propelled by geared turbines developing 13,000 s.h.p., can be distinguished from the motor ships of their class by their slightly higher funnels.

The "*Somali*" made her maiden voyage to the far East in January last year. The "*Shillong*" was completed at Tyneside two months later, and is a single screw steamer 525 ft. in length and 67 ft. in breadth. She has a cargo capacity of 10,750 tons deadweight, and space for 96,310 cu. ft. of refrigerated cargo.

Of special benefit to shippers is the "Cargoaire" system of ventilation, which provides complete control of the humidity of the air in the cargo spaces, thus avoiding any damage to the cargo through sweating and condensation, an ever-present danger in a trade in which climatic variations are great. Another special feature common to all four ships is the installation of tanks for the carriage of cargo oil or rubber latex in bulk. The "*Shillong*" has seven of these tanks.

The deck machinery of all four vessels is driven electrically, and includes winches and derricks, one of which will lift up to 50 tons. The appearance of these four new well-equipped express freighters, each capable of a speed of 18 knots, has been welcomed by merchants and shippers in the Malaya, China, and Japan trades.



A single cabin on the P. and O. cargo liner "Soudan." Express cargo ships are allowed to carry a small number of passengers.

The ships are of the shelter-deck type, and in addition to providing the most up-to-date facilities for cargoes they also have fine accommodation for 12 passengers, the maximum number allowed in this class of vessel. Each has four two-berth and four single-berth cabins well furnished in modern style. The cabins have hot and cold running water, and an ample provision of bathrooms and showers has been made. There is also a comfortable lounge, panelled in Empire woods, and a dining room that will seat 39 persons. This accommodation in fact is of a standard equivalent to first class in a larger passenger liner.

One reason for the introduction of such fast freight vessels on the Orient run is that, whereas goods which had to be

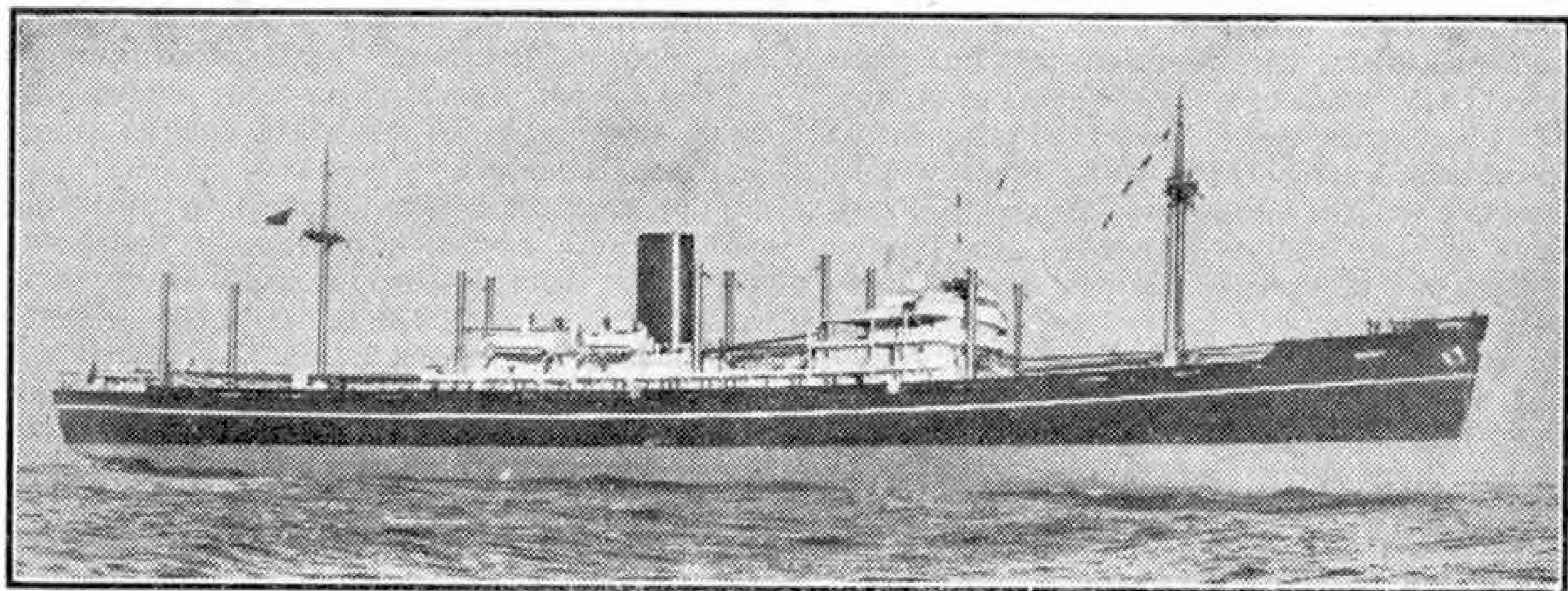
delivered promptly before the war were sent by passenger liners, the number of passenger vessels now operating is inadequate for the trade. So British shipbuilders were encouraged to build express cargo ships, even though these cost something like £1,000,000 each to construct and equip.

The four freighters just described are not the only ones put into service by the P. and O. Company since the war, and additional vessels of similar type have been built for other companies.

Last year, two new cargo motor ships built for the P. and O. were put into service between London and Calcutta. These sister ships, the "Cannanore" and the "Coromandel," came from Clydebank yards. With a deadweight of 10,500 tons and a length of 485 ft., they are of the open shelter-deck type with forecastle, and have 550,000 cu. ft. of cargo space, including 20,000 cu. ft. for refrigerated cargoes. This latter space can be increased to 100,000 cu. ft. if necessary.

There is one 30-ton derrick, besides eight 10-ton and eight 5-ton derricks to serve the holds. The vessels have single funnels and two masts, and are painted in the traditional P. and O. style, with a black hull and stone-coloured upperworks. The propelling machinery consists of one set of opposed-piston solid-injection engines developing 6,800 b.h.p.

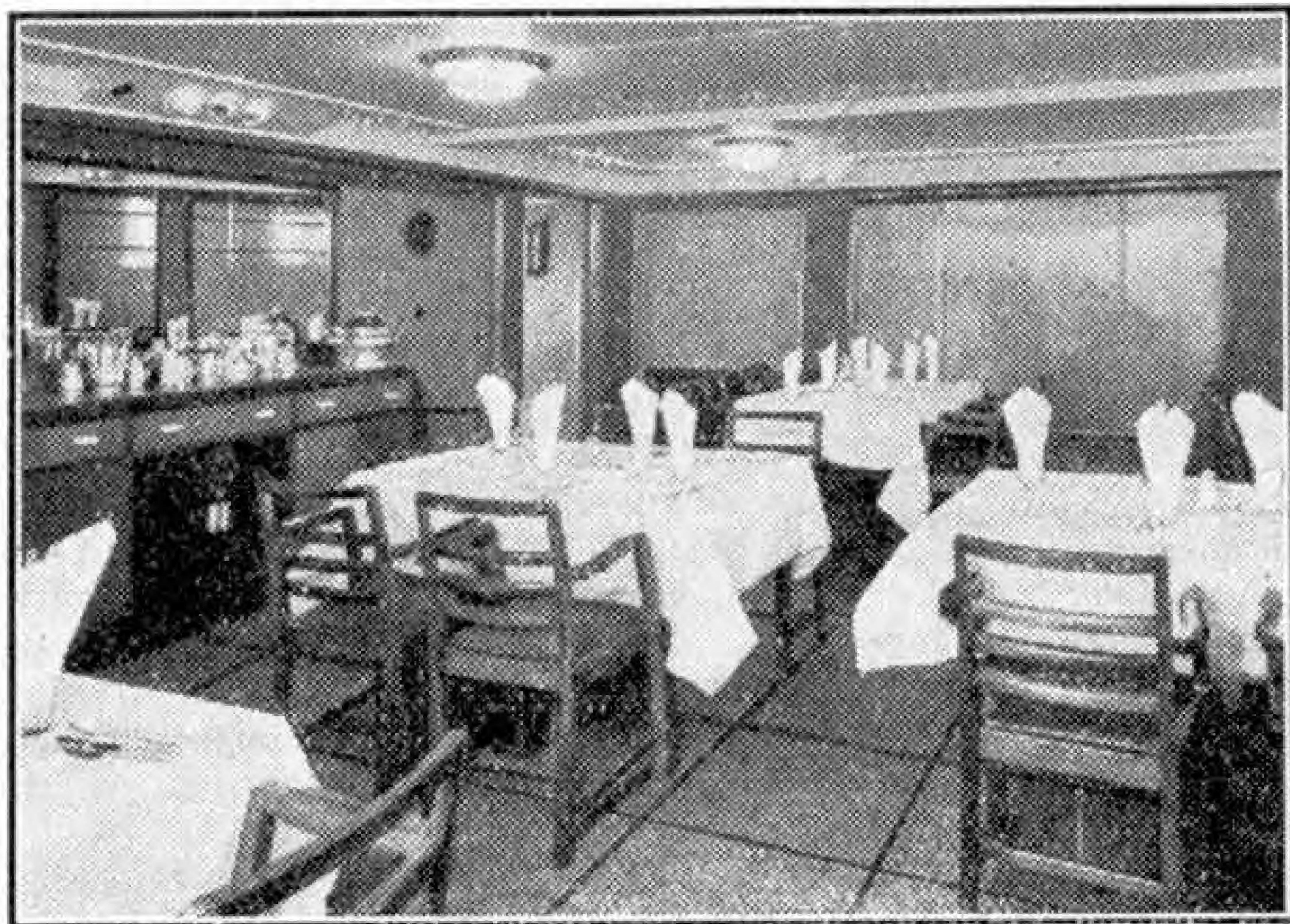
As in the "Soudan," "Somali," "Shillong" and "Surat," there is excellent accommodation for 12 passengers aboard the "Cannanore" and "Coromandel." It consists of tastefully furnished single and



The "Surat," which with her sister ship "Shillong" forms part of the post-war P. and O. fleet. The two vessels were built to provide an express cargo service between Britain and the Far East.

double cabins, a comfortable lounge, and a well-equipped dining room.

A further fleet of express cargo ships has been built by the Blue Funnel Line. These are single-screw motor ships of about 9,000 tons, and they are uniform in design. Sleek and fitted with the latest ideas in propulsion, they are running to the Orient and other parts of the world. The uniform design has been adopted to



The passengers' panelled dining room of the P. and O. "Soudan." She is a motor ship with a service speed of about 18 knots.

facilitate obtaining spare parts. Such facilities are particularly valuable at the present time, when the ship repairing business in the Orient is uncertain and slow. Uniformity of design will enable a range of spare parts, sufficient to meet all but the most unusual demands, to be available in the event of repairs being needed.

In building the express cargo ships, it has also been borne in mind that loading and unloading arrangements at Far East ports may fall below the required standard. To meet this snag, many of the latest freighters carry their own heavyweight derricks, so that they are largely independent of port facilities in this direction.

British shipyards have been busy building some very interesting cargo ships for European shipping lines. In September last, the first of nine outsized tankers, the 24,900-ton "*C. J. Hambro*," was delivered to her Norwegian owners by the Furness Shipbuilding Co. Ltd. She was the largest vessel built exclusively as a tanker until a sister ship was launched early this year.

The "*C. J. Hambro*" has an overall length of 589 ft. and a width of 80 ft.

She is constructed to Lloyd's highest class, and her decks and bottom shell are completely welded. The tank space is divided into 27 compartments with a total capacity of 23,450 tons of oil. About 1,600 tons of Diesel oil and 180 tons of boiler fuel can be carried in wing tanks and double bottom tanks under the engine room.

This up-to-date tanker, with her well-raked stem and cruiser-like stern, has two pump rooms, each with two steam pumps capable of pumping 400 tons of oil per hour. She is rigged as a two-masted fore-and-aft schooner, and her topmasts are telescopic. Her propelling machinery is a six-cylinder engine with a service output of 6,800 b.h.p., which drives a four-bladed propeller 17 ft. 8 in. in diameter. The fuel is diesel oil.

Not the least interesting feature is the wealth of other equipment and the excellent accommodation for the officers and crew. There are four steam winches, two warping capstans, and a windlass, while the steering gear is electric and can be controlled both from the wheelhouse and the poop deckhouse. Two loud hailer are fitted on the navigation bridge, and there are wireless sets in the several recreation rooms, and telephones throughout the vessel.

Two of the four lifeboats are fitted with a motor, and each boat is handled by electrically operated davits. An electric speed and distance recorder, an echo sounder, and an electric whistle and siren are included in the navigational equipment of the tanker, and she has eight projection-type floodlights to facilitate the handling of cargo at night.

The captain's suite, housed in the mid-ship bridge house, comprises a bedroom, dayroom, and bathroom, and there is a spare room and office. Similar accommodation is provided for the owner of the ship and the chief officer. The radio officer has a cabin on the navigation bridge, aft of the chartroom and adjoining the wireless room. Most of the cabins for the crew are single berth rooms, and there is a berth reading light and a connection for an electric fire in each cabin.

It is hardly surprising (Cont. on page 334)

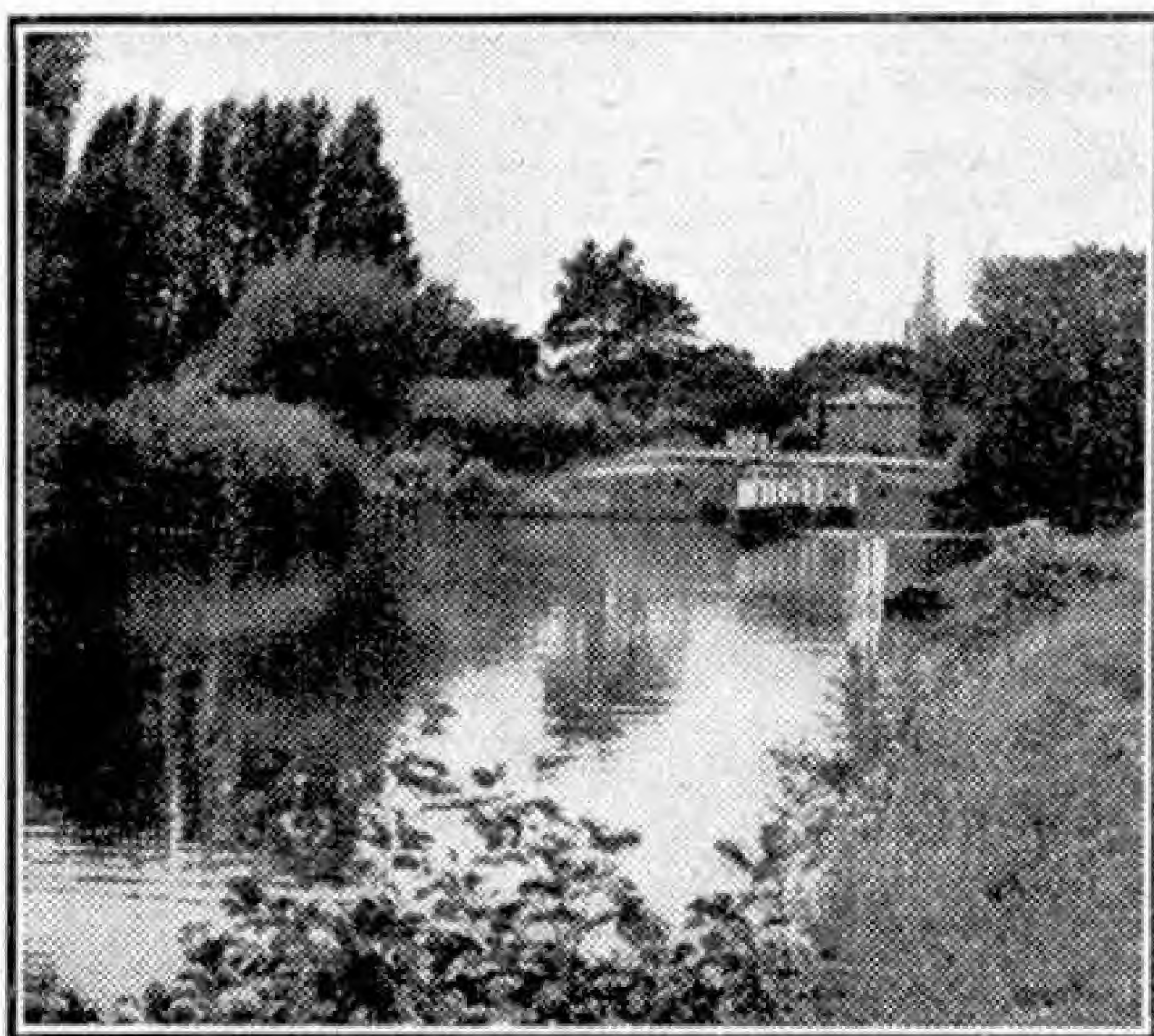
Camera Work in July

Landscapes

By John J. Curtis, A.R.P.S.

WHAT is your idea of a Landscape? Reference to a dictionary will provide this answer: "Representation of inland scenery." I like to think of our lovely country as being one huge landscape made up of innumerable small ones.

In order to impress that thought in your minds and to help you to collect some really good landscape pictures while on holiday, will you examine any painting, etching or other form of print representing



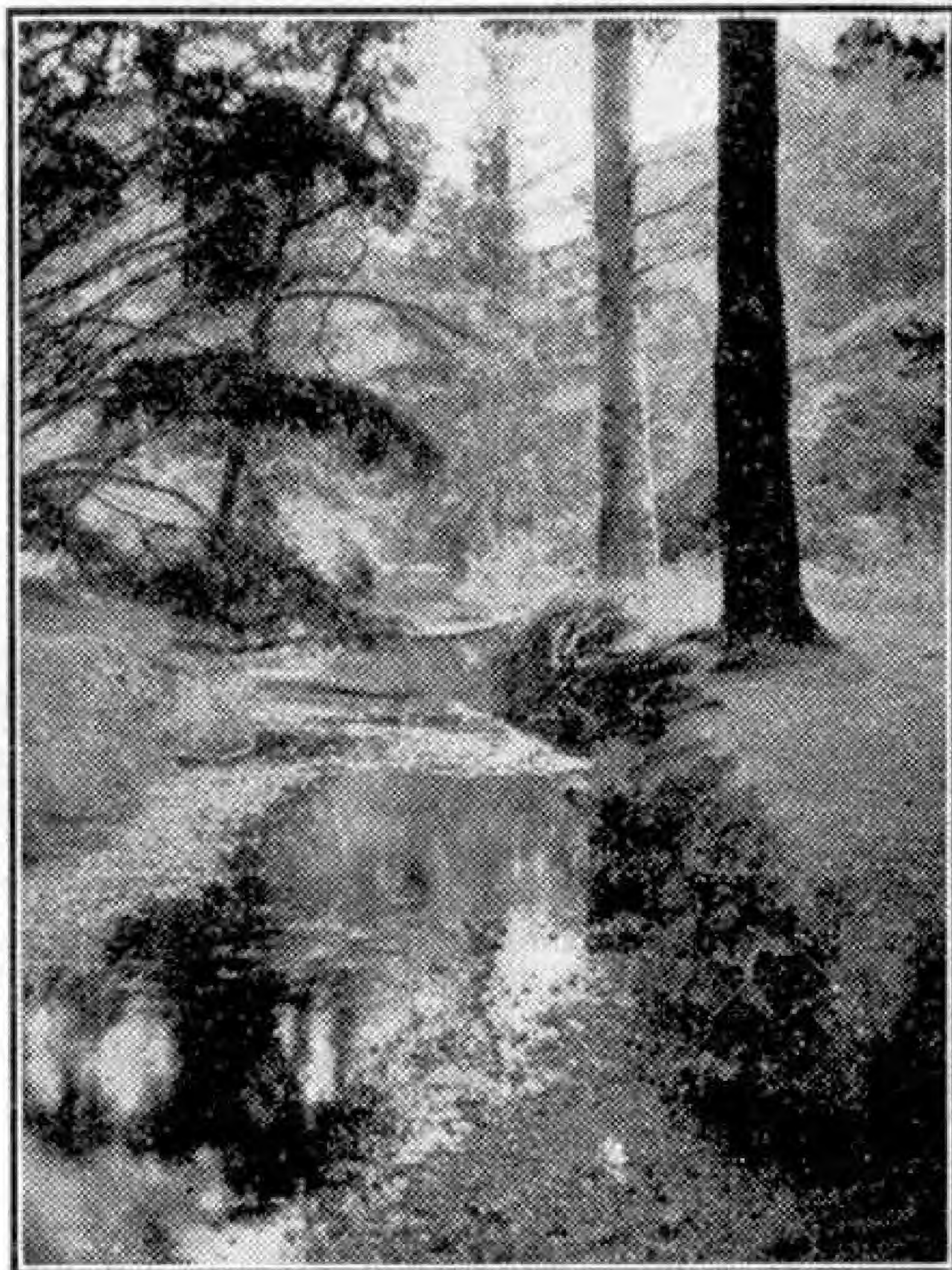
River scene near Maidenhead. Photograph by John J. Curtis, A.R.P.S.

this type of subject and pick out the important items which the artist has incorporated or used to produce the result. You will find trees, water, cottages or a church, a pathway or lane, and clouds.

There may be other details of less interest, but those mentioned are undoubtedly the most important, and are looked upon as components which, if harmoniously composed, will give a result that will definitely please the eye because it is a correct rendering of a scene we all admire.

A landscape can be of an extensive view covering a distance of many miles, but it is advisable to avoid these large panoramas unless there are some bold features in the foreground and middle distance. It is better to concentrate on views of a closer character, something which the eye can absorb quickly and completely, almost at a glance. I know how fascinating a "grand view" is and how one is tempted to have a shot, but so often the print is very disappointing.

A few hints as regards composition. When a lane or a stream is a feature it should not appear as if it was running across and out of the sides of



Solitude. A view at Rhineland, in the New Forest. Photograph by J. H. Stone, Barton-on-Sea, Hants.

the picture.

It can enter or leave the right or left-hand bottom corner, and to get it in that place it may be you must get in a different position when making the exposure. The question of position is quite important. When you find what looks like a possible picture do not attempt the exposure until you have moved about from one place to another and found where the best pictorial view can be gained. Do not have the most prominent detail right in the centre; a church or cottage can be on one side with a group of trees on the other and possibly a five barred gate somewhere near. The whole idea should be a quiet collection of details, forming a complete ensemble for the eye.

Use a medium speed ortho or panchromatic film, with a 2X filter to deal with the variety of colour and to give better clouds.



In the Doone Valley. Photograph by John J. Curtis, A.R.P.S.



A London Midland Compound 4-4-0 pulling hard near King's Norton while passing a northbound express. Photograph by J. D. Mills, Weston-super-Mare.

Railway Notes

By R. A. H. Weight

Summer Train Services

Apart from some high-season additional trains for the peak holiday period, which will commence running later in the month, the summer train services will be in full operation when this issue appears. All last year's named trains are running again and the "Thanet Belle" now makes two journeys each way between London and Ramsgate on Saturdays. There are the following named additions: "The Easterling" between Liverpool St. and Yarmouth; "The Broadman" from Cromer and Norwich to Liverpool St. and back; "The Red Dragon" from S. Wales to Paddington and back; and "The Tynesider," a night sleeping car service on the King's Cross-Newcastle route. There are 492 restaurant-car trains on ordinary weekdays, with an increase to no less than 554 on Saturdays.

The number of all-Pullman services remains at 19; there are also many buffet cars as well as trains conveying Pullman refreshment cars.

Further progress has been made with decrease of overall times including shorter station stops, with standardised departure times for definite routes, and in the running of through cross-country holiday services, especially at weekends, avoiding a change in London or other large centres. Examples of new trains are Manchester (London Road) and Stoke-on-Trent; also Birmingham (Snow Hill) to Brighton, Eastbourne and Hastings; Birmingham to Paignton; Newcastle to Llandudno; Clacton to Mansfield; Newquay to Bristol. Some of the through trains traverse unusual avoiding lines during parts of their journeys in order to reduce congestion at key stations or junctions.

For the benefit of residents on the outskirts of London or other large cities, certain long-distance trains call at stations near the outer suburbs, such as Ealing Broadway, Watford, Sevenoaks, Bromley South, Surbiton, Wilmslow, Mossley Hill or Stechford.

Additional Continental steamer services are being run. The popular pre-war 4.30 p.m. departure from Victoria to Folkestone, connecting to Switzerland and beyond, has been restored this summer. The cheap and popular weekly "runabout tickets" available

for a week in a given area are now issued to cover 77 different districts or groups of lines.

Rolling Stock and Track Repair Programmes

The Railway Executive recently announced plans to renew 1,800 miles of track this year, including 580 miles with flat-bottom rails. Mechanical methods will be used as far as possible to carry out the work expeditiously. This also applies to the 155 bridge renewals scheduled for 1950. In 19 cases when these are completed higher speeds will be possible; four of the new bridges will also permit the use of heavier engines. It is estimated that about three more years will elapse before the whole of the main line tracks will have been restored to such pre-war standards of age and maintenance as to permit the high speeds that were regularly run by the fastest trains in 1938-9.

There is still an acute shortage of modern passenger carriages, but it is hoped to build over 2,000 new ones this year, together with about 1,300 vans, horse-boxes and so on, and 33,000 freight wagons. The locomotive construction programme provides for 476 new engines of various types.

News from the London Midland Region

New engines lately placed in service are numbered and allocated as follows: class "2" light 2-6-0 mixed traffic: No. 46445, 2D, Coventry; Nos. 46446-9, 46455, 5A, Crewe North; Nos. 46450-1, 19A, Sheffield; Nos. 46452-3, 20E, Manningham; No. 46454, 17A, Derby. Class "4" 2-6-4T: No. 42137, 15C, Leicester; Nos. 42138-9, 14B, Kentish Town; No. 42140, 16A, Nottingham; and No. 42141, 21A, Saltley. More class "2" 2-6-0s are in hand at Crewe.

A recent withdrawal from service was No. 22853, the last of the Belpaire-boilered Kirtley double-framed 0-6-0s, built in 1873 by Messrs. Dubs and Co., and rebuilt in 1922 when the Belpaire boiler was fitted. Matthew Kirtley, who was the first Locomotive Superintendent of the Midland Railway, died in 1873. One of his 0-6-0s, now No. 22630, belonging to the "480" 0-6-0 class originally introduced in 1863, still survives with round-top boiler.

Three "5XP" or "Jubilee" 4-6-0s were lately reported to be still running with domeless boilers, which were standard for the type at first. They were Nos. 45575, 45579 and 45615. "Garratt" articulated freight engines have been working through from Toton Yard, Notts., to sidings near Bristol with loaded mineral trains south-bound and return empties.

Styles of locomotive painting still vary a good deal. Renumbering is well advanced. Withdrawals of ex-Midland class "3" and class "4" Compound 4-4-0s continue. Decision to scrap or not depends on condition of boiler, frames and so on.

A very fine run has been reported to us, made by "6P" reboilered "Patriot," No. 45525, "Colwyn Bay," with a load of about 365 tons on the 4.30 p.m. Euston to Birmingham and Wolverhampton express. The train had been stopped by signals a few miles out at Queen's Park; there was a permanent way repair slowing beyond Harrow, but the 42½ miles, uphill and down over moderate gradings, between Watford and Roade junctions were reeled off in 36½ min. with maximum speeds slightly exceeding 80 m.p.h. at several points. The minimum was 59 near Tring summit. The first stop at Blisworth was reached before time, giving the equivalent of a 62½-mile unchecked run from Euston in no more than 63 minutes!

Two trains spraying weed-killing solution over the track have covered nearly 3,500 miles.

Notable Expresses in Australia

We illustrate this month one of the air-conditioned New South Wales Government Railways' expresses, of which the "Riverina" is an example, hauled by a modern class "C.38" 4-6-2 engine carrying a boiler pressure of 245 lb. per sq. in., the highest employed in Australia. The large outside cylinders are of 21½ in. diameter with 26 in. stroke. Coupled wheels have the moderate diameter of 5 ft. 9 in. and the tractive effort is estimated at 36,200 lb.

These fine "Pacifics" were built in Australia. They were designed to negotiate steep gradients as well as to attain speeds up to 70 m.p.h., thus being of the powerful mixed traffic type so much used in various parts of the world. Reference has been made in a previous issue to some of the notable features of the train's equipment; they operate from Sydney, Newcastle and elsewhere.

New Type Guard's Compartment

British Railways announce a new standard type of guard's and luggage compartment to be incorporated in main line passenger rolling stock of the future. Therein will be found a revolving "tub" seat; a periscope look-out along the train, and an electric food warmer, together with steam heating and the usual emergency equipment, as well as trays or racks for letters and small packages.

Western Tidings

Red backgrounds are being increasingly provided for engine nameplates on the Western and other Regions. On the W.R. it is noted that a similar background appears on the number plates of a good many engines lately ex-works, which should be a great help in reading metal numbers from a distance.

The gas turbine locomotive, No. 18000, after being engaged on further trials with empty passenger trains,

was available at Paddington for Press inspection early in May. Subsequently it worked out on the 2.15 p.m. for Cheltenham. At the time of writing it was expected to begin express long-distance running during the early summer. It is only to run on routes permitted for "King" class engines, we understand. Construction of the similar British-built locomotive is progressing.

The 41xx class of 2-6-2T is used a good deal for heavy passenger work between Cheltenham and



An air-conditioned express on the New South Wales Railways, Australia, hauled by "C.38" class 4-6-2 locomotive. Photograph by courtesy of the New South Wales Government Railways.

Gloucester, including the haulage of London expresses between those points. Interesting regular interchange working of W.R. and L.M.R. locomotives continues to be reported from the Shrewsbury-Hereford area that is traversed by long-distance through trains jointly provided by the two Regions.

The following new engines had been placed in service up to May last: 4-6-0 "Hall" class Nos. 7912-8 named respectively "Little Linford Hall," "Little Wyrley Hall," "Lleweni Hall," "Mere Hall," "Mobberley Hall," "North Aston Hall," and "Rhose Wood Hall;" 0-6-0T built at Swindon Nos. 7445-9, also Nos. 8415-9, 8457-8, 9412-4, constructed by contract.

The reconversion of oil-burning locomotives to coal has been completed.

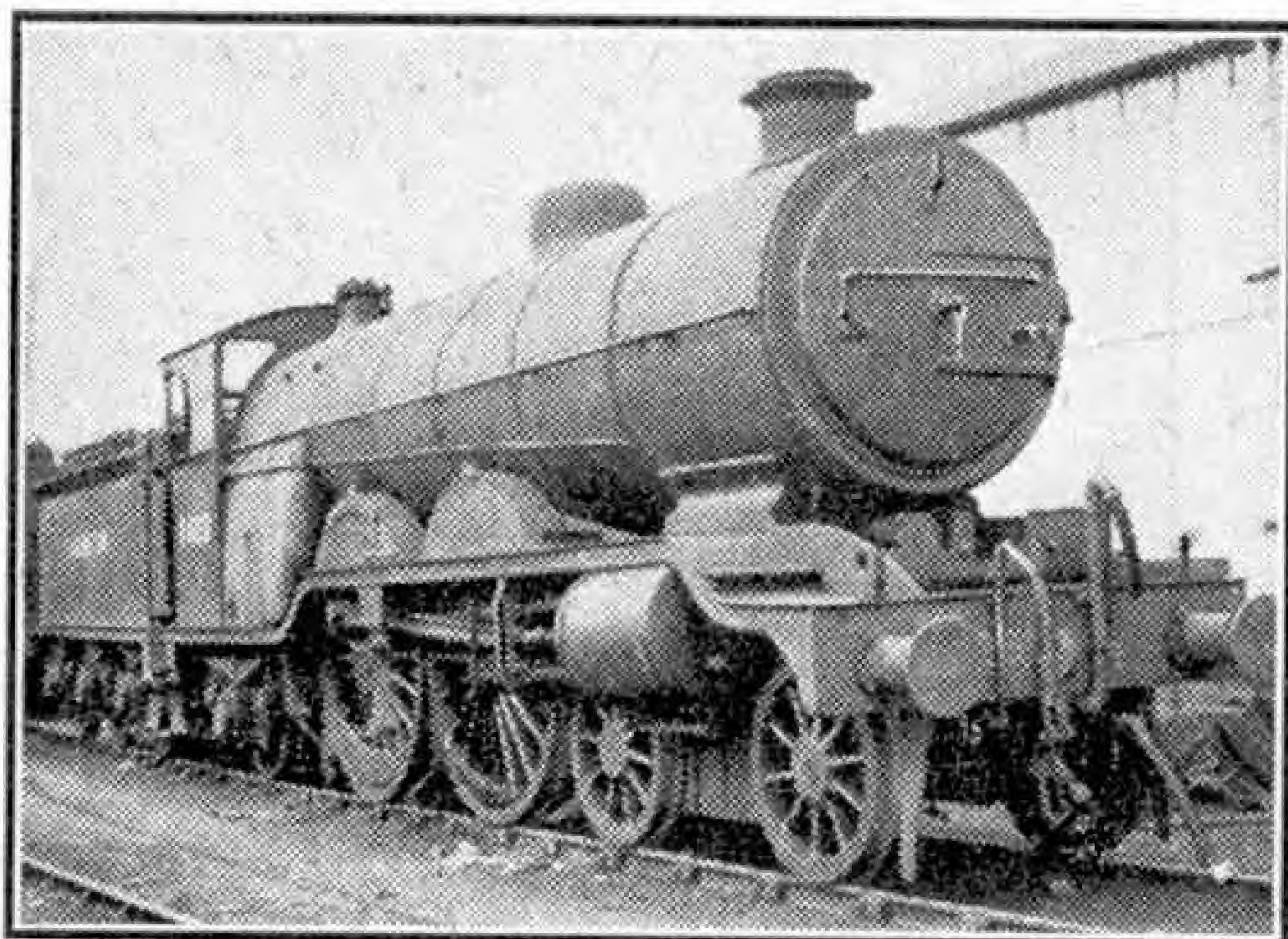
A tender recently constructed at Swindon is of standard type in appearance, made of steel, but the 4,000 gall. water tank within is of aluminium. This metal is used also for air vents, manholes and covers, joints being sealed by bitumen-impregnated cardboard.

The Bernese Oberland Railway

The photograph and reference to the Bernese Oberland locomotive that appeared in the April "M.M." has prompted the following notes from Mr. J. W. Fowler.

The metre gauge line between Interlaken and Lucerne, by way of the Brunig pass, belongs to the State Railways and is the only metre gauge section that the State Railways own. This line is worked at 15,000 volts, which is standard for normal gauge lines in Switzerland.

The Bernese Oberland Railway, the other metre gauge line, from Interlaken, runs to Zweilütschinen, where it divides for Grindelwald and Lauterbrunnen. It has a total length of 14½ miles. This line is worked on the low-tension D.C. system, and before the Lucerne line was electrified the steam locomotive shown recently in the "M.M." shunted trains between these two narrow gauge systems at Interlaken. Now, battery-driven locomotives are used for this work.



Southern No. 2423 "The Needles," a Brighton "Atlantic" of class H.2, now scrapped. The engine was waiting for overhaul at Eastleigh last year when photographed by R. E. Vincent.

Fighting the Avalanche

By Francis J. Knight

ALTHOUGH Davos is the centre for many British ski enthusiasts, few of them realise how much of their sport, and indeed their safety, they owe to the men working in the squat building that they can see from their hotel windows. This building is the Institute for the Study of Snow and Avalanches, or Avalanche Research Station, and is the only one of its kind in the world. The Principal and Chief Engineer is Herr Bucher, and the main tasks of the Institute are to protect Swiss mountain villages and railways, and to maintain a keen watch to avert any danger that may threaten the long ski runs and glissades of Europe's playground.

A glance at a Swiss railway map will show that many important lines attain heights of from 5,000 to 6,000 ft. and several go much higher. The Furka-Oberalp railway reaches 6,600 ft. and the Bernina 7,400 ft. The "Passenbahn," which carries skiers up to Davos, and the St. Moritz funicular, taking visitors up to Corviglia, both reach a height of more than 8,000 ft.; the Zermatt rack railway reaches 10,200 ft., and the Jungfrau rack railway attains a height of over 11,000 ft.

Since 1939 there has been an even more compelling pressure. During the war years the Swiss nation has been obliged to take the question of national defence seriously and extensive preparations against possible invasion have been made. The first requirement of the Swiss Army Command was freedom of movement—a guarantee of mobility for their troops in any weather. It was of the first importance to keep open at all times and at any cost the St. Gothard, Simplon and Bernina routes, to name only the most important. It is against this background of possible invasion that work at Davos has been pressed forward since 1939. Crystallographers and physicists have pushed on their researches until the winter snows of Switzerland now have few secrets from the men at Davos.

In the laboratories and outside in the snowfields Herr Bucher and his assistants have studied snow in all its forms, from the texture of falling snowflakes to the composition, resistance to compression, tendency to "creep," temperature and pressure of great masses of snow. In

the laboratory it is not uncommon for work to be done at temperatures down to 40 degrees below zero!

One simple method of studying the pressure of snow is by stretching lengths of different coloured wool on the surface at varying times. When these pieces are dug out later, the different depths at which those of the same colour are found enable the research workers to chart the snow pressure and movement over a particular area.

The information collected in the laboratory is checked in the expanse of experimental snowfields attached to the station. Here deep calibrated sounding rods are buried. These permit the observation through the winter of the behaviour of the snow bed, the effect of the constant fresh falls, and variations in wind and temperature. Another instrument is in the form of a wooden horse which is



The beginning of an avalanche. Photograph by W. Conitz, reproduced by courtesy of the Swiss Federal Railways.

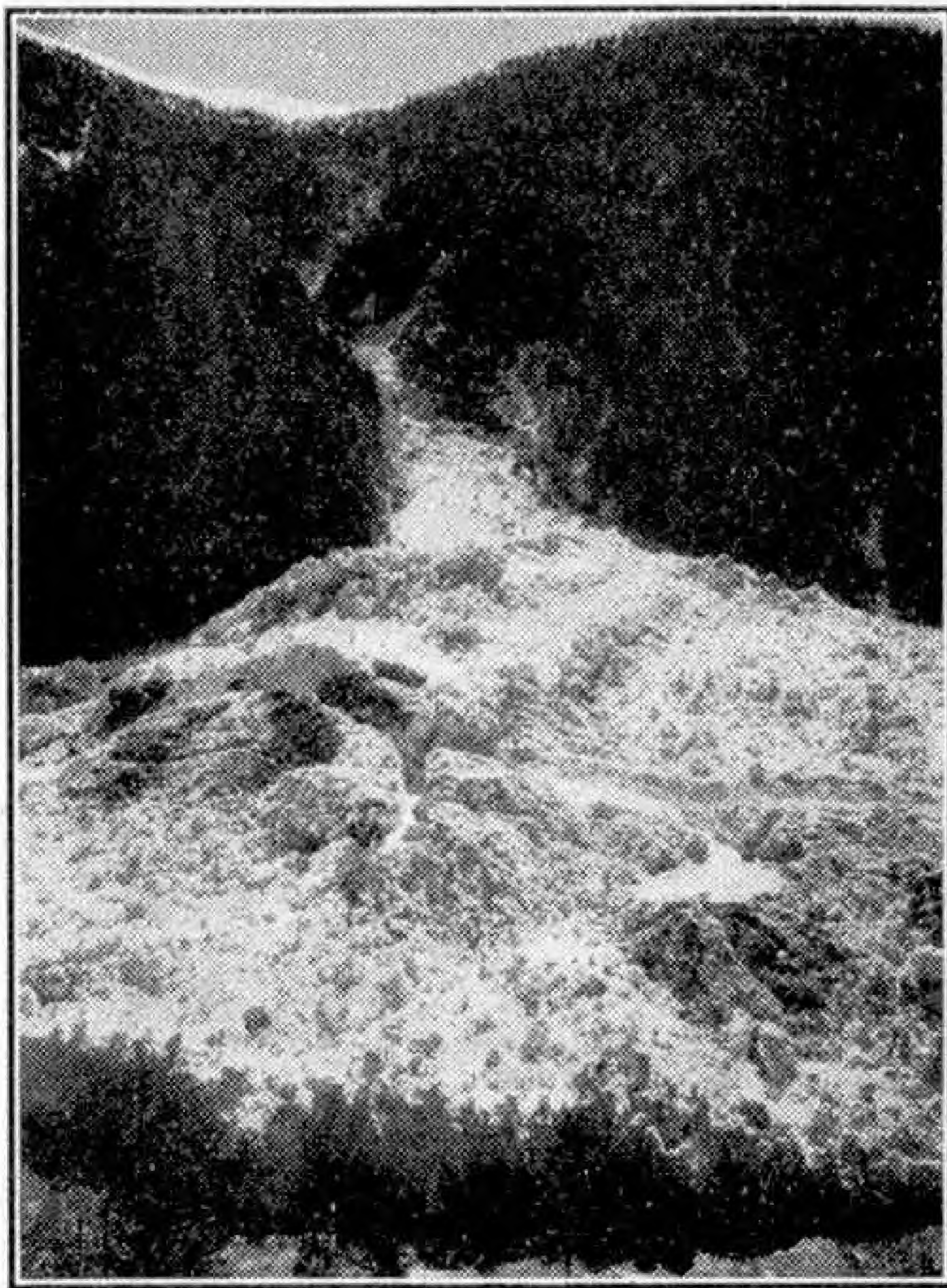
placed against the side of a snowbank and measures the pressure exerted by the snow mass.

There is one part of the research work at Davos which is performed exclusively for winter sports enthusiasts. Scattered around the whole winter sports area are some 30 observation posts. Here soundings are taken, snow profiles studied and temperature and pressures recorded. Each Friday evening these observation posts report to Davos and, on the basis of their reports, the Research Institute issues a week-end bulletin that warns ski leaders of the latest avalanche possibilities and the security of the various mountain runs.

The area around Davos is one of the most popular ski centres in Switzerland and, as we should expect, the accident prevention measures are excellent. There are some 20 recognised ski runs on and around Mount Weissfluhjoch, and at intervals along all of the runs are First Aid posts, each equipped with a telephone. Speedy help for the victim of an accident is assured by the security patrols organised by Herr Jost of the Research Station. Equipped with the necessary tools for any emergency—signalling instruments, powerful flares for night rescue work and an elaborate first-aid kit that includes bottles of oxygen—and accompanied by dogs who have been trained to scent out people buried beneath the snow, the security patrols stand by at all hours ready for instant action.

But the men of the Davos Station do not merely stand by and wait for an avalanche to start. Their knowledge of the structure of the various types of avalanche, coupled with a detailed knowledge of local conditions, often enables them to take positive action to disperse a forming avalanche or to divert its course.

To the research workers avalanches are divided into three kinds. Of these, the Staub-Lawine or Dust-Snow avalanche is the most dangerous and the most difficult to guard against. This is a mass of freshly piled loose snow set in movement by a gale of wind, which in these mountain areas often reaches tornado force. This huge mass—often there are several hundred tons of snow—is driven down the mountain side at great speed, sweeping everything before it. When it finally comes to rest, a thick icy crust is formed at top and sides, and beneath this crust may



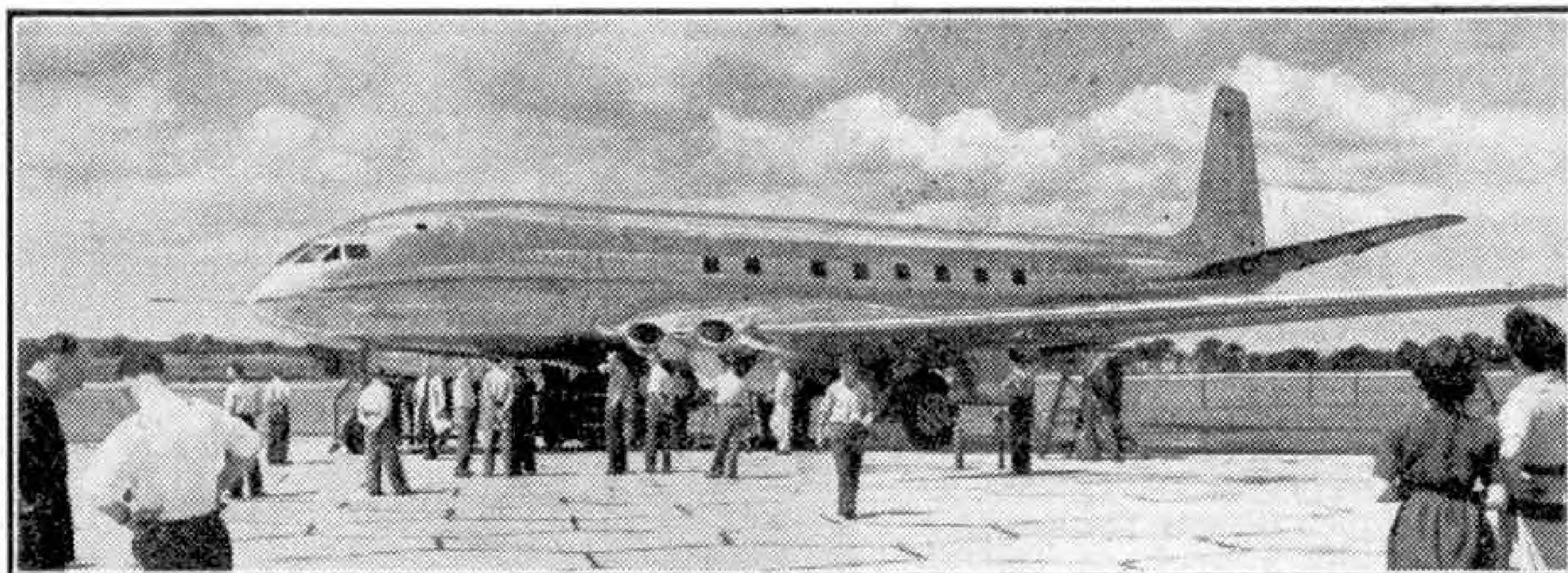
Digging a way through a gigantic river of snow. Photograph by E. Meerkamper, reproduced by courtesy of the Swiss Federal Railways.

lie men or animals trapped in the mad rush. Danger spots where a Staub-Lawine is likely to start are watched, and the Davos Research Station regularly undertakes the work of dispersing the huge pockets of drift snow which form the core of such an avalanche.

The usual type of Spring avalanche, the Schlag-Lawine or Stroke Avalanche, is much easier to guard against. The Schlag-Lawine lumbers down the mountain like a swiftly flowing river of snow, pushing aside houses, bridges and any other obstructions that lie in its path. It is caused by snow that has piled up during the winter becoming unstable under the influence of the warmer spring weather. The top part of the snow mass loses its cohesion and begins to slide downward, helped by the slippery surface of the frozen snow beneath. Similar to the Schlag-Lawine is the Grund-Lawine, whose peculiarity is the great amount of earth and rubbish that it accumulates and carries along with it.

Against all three types of avalanche the Research Station

(Continued on page 334)



Britain's Queen of the Skies

The Story of the de Havilland "Comet"

By Dennis M. Powell

NOT since the short "Empire" flying boat first flew back in 1936 has an all-British designed and built air liner created such world-wide interest and enthusiasm as the "Comet" air liner powered by four de Havilland "Ghost" pure jet engines.

Ever since this product of British aeronautical genius first flew on 27th July last year in the hands of one of Great Britain's foremost test pilots, John Cunningham, and his team of de Havilland experts, the "Comet" has hit the headlines of the world's Press and especially the aviation magazines published in this country and America.

Across the Atlantic the U.S. aircraft industry and airline companies are watching with a good deal of envy and foreboding the continued spectacular progress and achievements of our "Comet" air liner, whose builders need no introduction in the field of international aviation.

From its modest and humble beginnings of a small workshop and hangar at Stag Lane, Hendon, in 1920, by Capt. (now Sir Geoffrey) de Havilland and his pioneer associates, the Company has expanded progressively during the past quarter of a century and is to-day among the most famous aircraft manufacturers in the world, whose 'planes are flying in something like forty different countries. It has associated companies in Canada, South Africa, Australia and New Zealand.

De Havillands' history up to the beginning of the war was largely a record of production of successful commercial 'planes, both air liners and private-owner machines, including the famous "Tiger Moth" trainer which was widely used by the R.A.F. and many foreign Air Forces—over 20,000 of them were built. The Company greatly increased its prestige during World War II by producing vast numbers of the highly successful "Mosquito"—one of the most versatile aircraft ever built. This was followed by the "Hornet" long-range fighter and the D.H.100 "Vampire" jet fighter. The latter

have been produced in very large numbers since the end of the war, and supplied to the Air Forces of Western Union countries as well as to the R.A.F. and several Commonwealth Air Forces. The "Vampire" was the first aircraft in the world to exceed 500 m.p.h. in

level flight, and still holds the world's altitude record of 59,445 ft. set up on March 23rd 1948 by Test Pilot John Cunningham.

But let us return to the D.H. 106 "Comet" air liner, which is our main topic. The Company decided to build the 'plane just over three years ago, and, accordingly, drew up the necessary specification and design. The aircraft will carry an operational crew of four plus a steward and stewardess and a load of between 36-48 passengers, depending upon the distance of the route flown—that is,

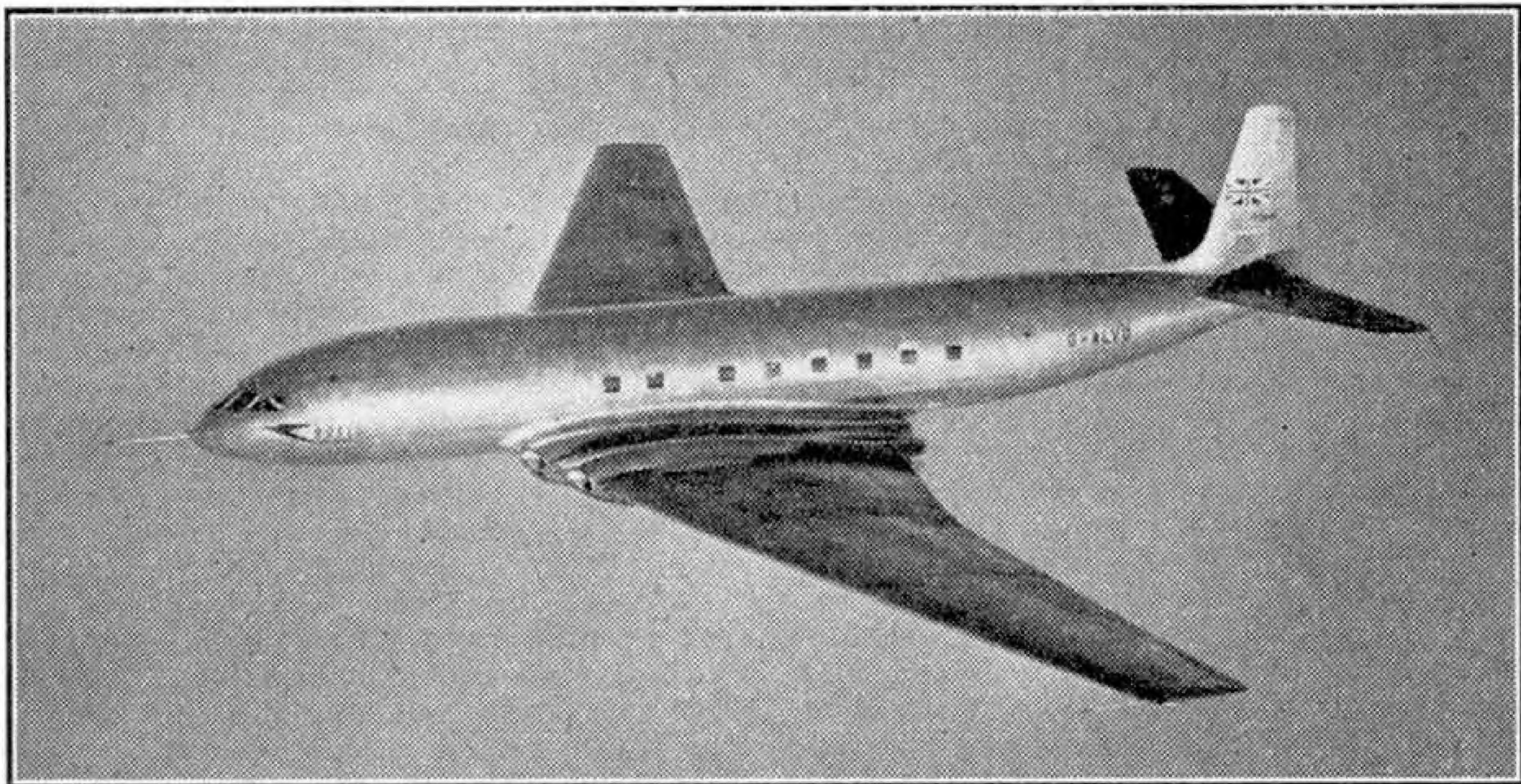
The photograph above shows the de Havilland "Comet" at Hatfield aerodrome after the maiden flight. The illustrations to this article are reproduced by courtesy of de Havilland Enterprise.

up to 36 for the long-distance stages of 2,500 miles, and a maximum of 48 for 1,000-1,500 mile stages.

The passengers will be accommodated in fully-reclining chairs with adequate leg-room, similar to the American "sleeperette" type, which are expected to give all the rest that will be necessary for the relatively short times that will be spent in the air, even on the long-distance stages. Passenger facilities include two toilet-dressing rooms for both ladies and gentlemen (the gentlemen's will have an electric razor amongst its facilities), luggage and air-cargo compartments, a wardrobe for passengers'

Since the "Comet" is powered by four de Havilland-built "Ghost" jet turbines (having a total "thrust" of 20,000 lb., which at 500 m.p.h. is equivalent to about 40,000 h.p.), the normal vibration which is felt in even the best sound-proofed piston-engined air liners in the world will, it is confidently expected by de Havillands, be relatively non-existent when the "Comet" is fully sound-proofed and the final pressurised equipment fitted.

Intended for express services along the trunk routes of the British Commonwealth, the "Comet" will also be suitable for inter-continental services generally, for it is



A fine view of this new British air liner in flight, showing the sharply swept-back wings.

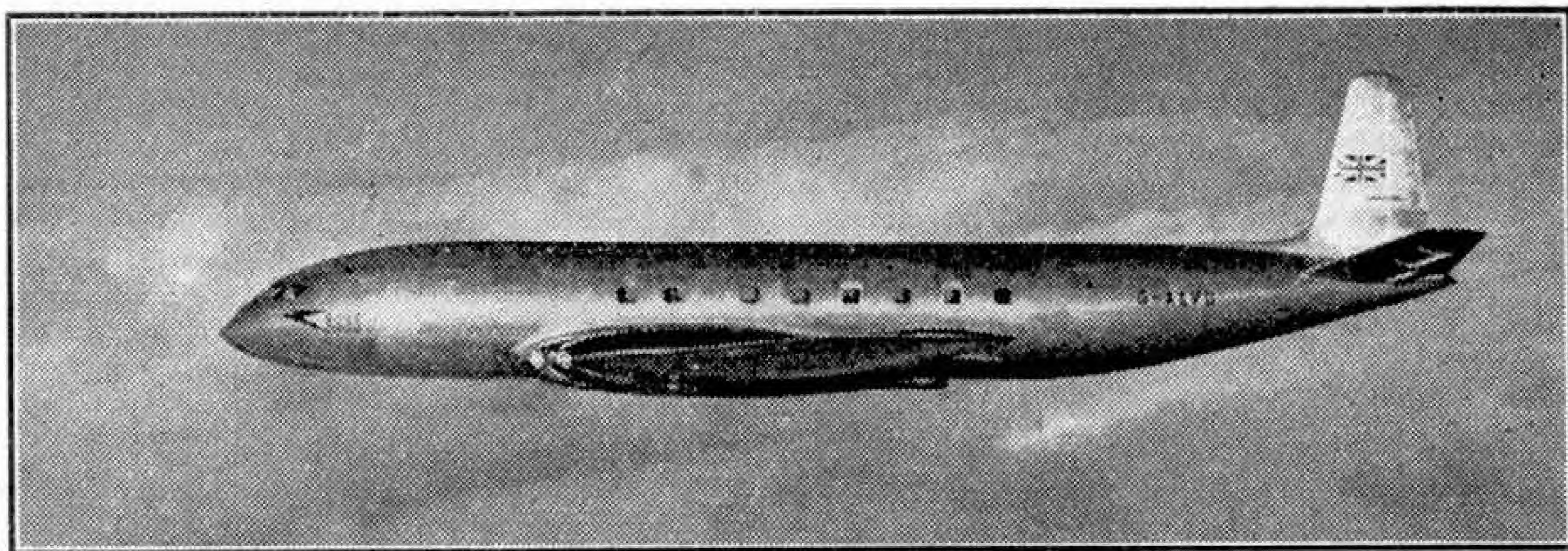
coats, etc., plus an up-to-the minute air liner kitchen equipped with the most modern devices for preparing delicious meals aloft.

Each pair of passengers will have an oblong window, but at 40,000 ft. (the most favourable operational height of the "Comet") the sky will appear mauve and darkened; and below, if the weather is clear, they will see only the outline of countries in a map-like panorama.

Captain of the "Comet" will sit on the left in the aircraft's "bridge" (control cabin) and the First Officer will sit on his right, with dual controls for both. Behind the Captain, and sitting at right angles to him, will be the Navigator with his table equipped with charts and other navigational equipment; and almost to the back of the First Officer will be the Radio Officer manipulating the latest radio equipment for air liner use, including long-range radar.

essentially an air liner for world operation. Its high speed—cruising 450-490 m.p.h., with a maximum of 575 m.p.h. plus—will materially aid its economy by making it possible to fly more miles and carry more ton-miles of payload in a year of operation than the conventional types of American air liners now in world-wide use.

With Chief Test Pilot John Cunningham at the controls, with his crew of four—Messrs. Wilson, Reynolds, Waters, and Fairbrother—the magnificent and shapely beautiful aircraft made its now historic first flight from Hatfield (Herts.) on 27th July last year, remaining aloft for 31 min. Since that date the "Comet" has logged the impressive total of 248 hrs., operating no less than 171 separate flights. Three notable overseas "hops" have been accomplished, and each of these has broken all previous records in respect of speed and timing.



The long, slim fuselage of the "Comet" is here seen to advantage.

These notable "hops" are:

London to Tripoli and return in 6 hrs. 38 min.—Distance: 3,000 miles. Average speeds: out—440 m.p.h.; home—456 m.p.h.

London to Rome and return in 4 hrs. 7 min.—Distance: 1,832 miles. Average speeds: out—447 m.p.h.; home—442 m.p.h.

London to Copenhagen and return in 2 hrs. 44 min.—Distance: 1,180 miles. Average speeds: out—454 m.p.h.; home—420 m.p.h.

On the Rome and Copenhagen flights 16 and 18 passengers were carried respectively, whilst distinguished people who have already flown in the "Comet" have been Lord Pakenham, Sir Miles Thomas (Chairman B.O.A.C.), Viscount Trenchard (Founder of the Royal Air Force), and Air Marshal Sir Alec Coryton (Controller of Supplies (Air) M.O.S.). Everybody who has had the privilege of flying in this last word in jet air liners has been greatly impressed with its comfort and astounding high speed coupled with rock-like steadiness when flying at 35,000 ft.

"Comet" production is now in full swing at the parent factory of the de Havilland Enterprise, and it is confidently expected that the first production aircraft

will be delivered to B.O.A.C. by mid-1951 at the latest, and several will be in regular service on some sectors of the U.K.-Australian route by early 1952, or even sooner. A total of 14 "Comets" are being built for B.O.A.C., and two for Canadian Pacific Airlines who will operate them on trans-Pacific schedules between Vancouver, Tokyo, and Hong Kong. An unofficial report states that a further six "Comets" have been ordered by the Sabena Belgian Government Airlines for their Brussels-Congo route. At least one major American Airline is reported to be seriously considering the possibilities of purchasing "Comets," since the U.S. industry has not yet produced a jet air liner to compare with this all-British achievement.

Whatever the outcome of export orders, the future success of the "Comet" on the Commonwealth air routes is a certainty!

The wing span of the "Comet" is 115 ft., length 93 ft., height 27 ft., and the loaded weight is just over 40 tons. The wing itself has a moderate sweep-back of 25 deg., and from the accompanying photographs will be readily appreciated its exceptionally clean aerodynamic form and beauty of line.

Another New de Havilland Air Liner

Another new de Havilland 4-engined air liner, the "Heron," made its first flight on the 10th May last, and the pilot expressed himself well satisfied with its performance. It is a feeder-line aircraft, intended to fill the growing need for a medium size transport carrying from 10 to 17 passengers. With an all-up weight of 12,500 lbs. it can carry $1\frac{1}{2}$ tons of payload on the relatively short stages of branch-line services.

As a feeder-liner the "Heron" will

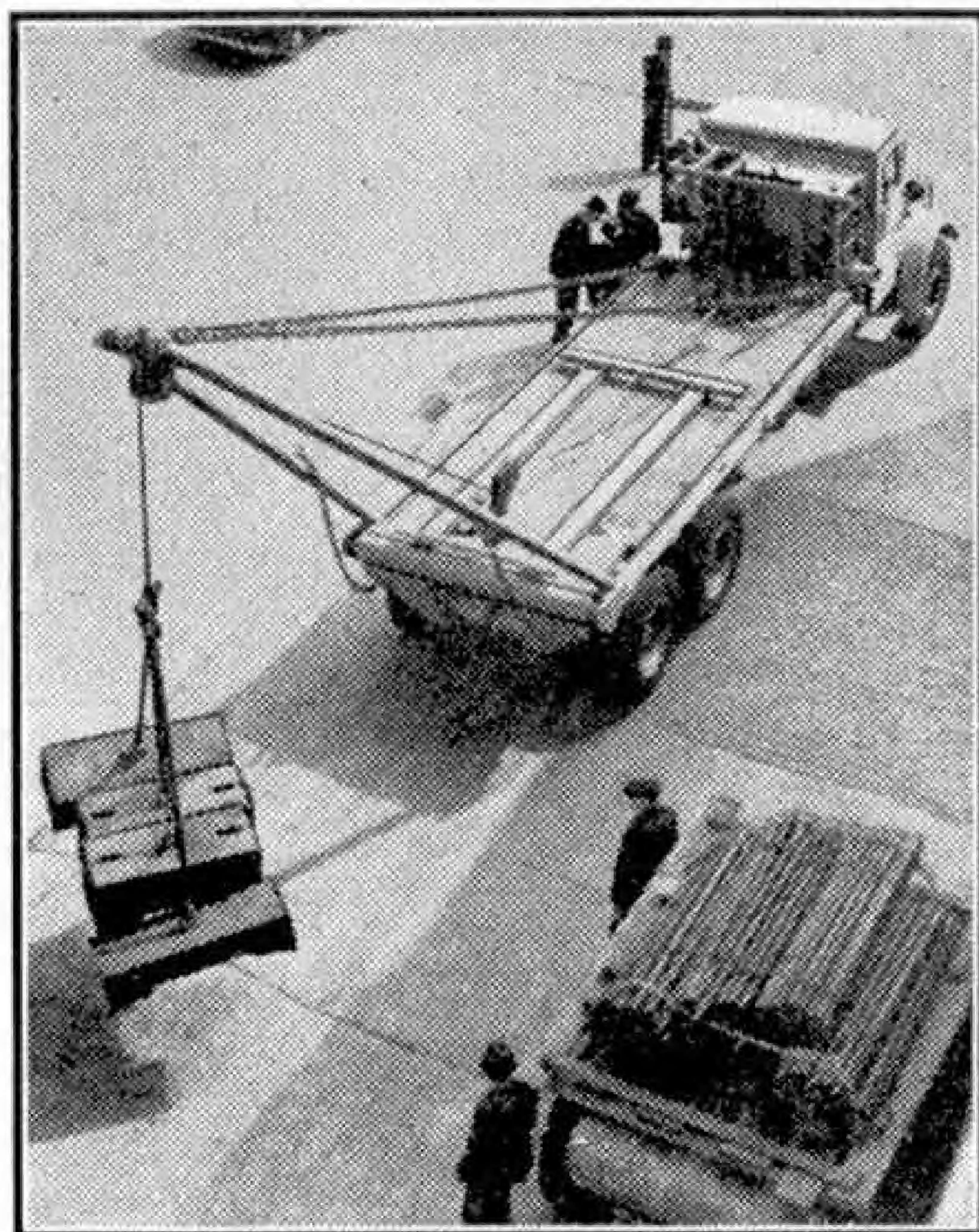
be called upon to use small airfields with limited facilities, and for this reason it has been designed for quick take-off and a short landing run. An exceptionally simple formula has been adopted employing unsupercharged ungeared "Gipsy Queen" 30 engines, constant-speed propellers, a non-retractable undercarriage, and the simplest of control systems and services without any hydraulics. It incorporates many components of the smaller D.H. "Dove," and thus "Hérons" can be quickly produced from existing tooling, with a consequent reduction in the cost of both aircraft and spare parts.

Self-Loading Truck for Oilfield Work

THE self-loading truck illustrated at the foot of this page was built by Leyland Motors Ltd. for the Shell group of oil companies, which has a number of these vehicles now in operation. It is designed for handling and transporting heavy equipment over roadless country in developing new oilfields and extending those already existing.

The super-Hippo Chassis on which the truck is based has been specially designed for really heavy work overseas. The engine is the well-tried Leyland six-cylinder direct injection diesel unit of 600 cu. in. capacity, which is constructed as a unit with a robust five-speed gear-box. There is an auxiliary gear-box, also with five speeds, so that altogether 10 forward speeds are provided. Compressed air brakes are fitted to all six wheels.

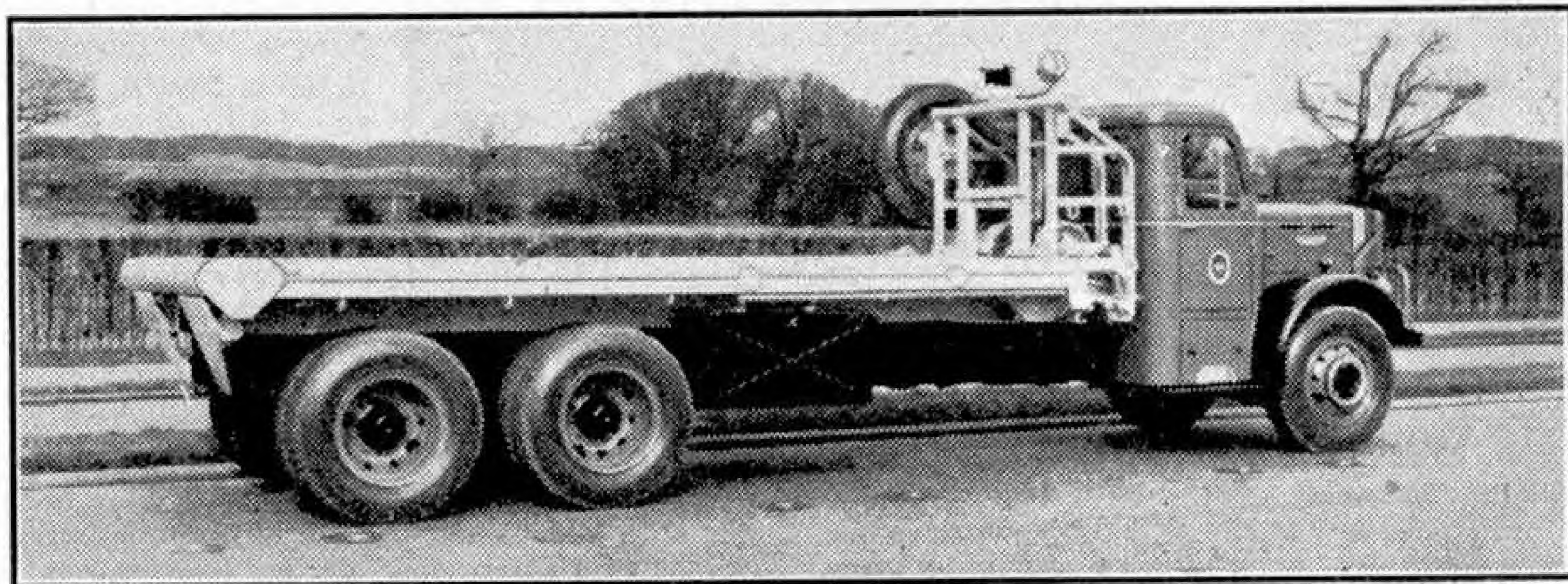
The platform of the truck consists of tropicalised hard wood $2\frac{1}{2}$ in. in thickness covered by a steel deck plate $\frac{1}{4}$ in. thick. The body was built by R. A. Dyson and Co. Ltd., Liverpool, to the requirements of the Shell Company, and it is equipped with a winch driven from the input shaft of the auxiliary gear-box. With this pieces of machinery weighing 33,000 lb. or more already mounted on skids can easily be loaded or unloaded in a few minutes by the driver, working without assistance. The load is hauled up ramps at the back of the truck, and over the roller at its tail, by means of the winch, which is capable of exerting a pull of



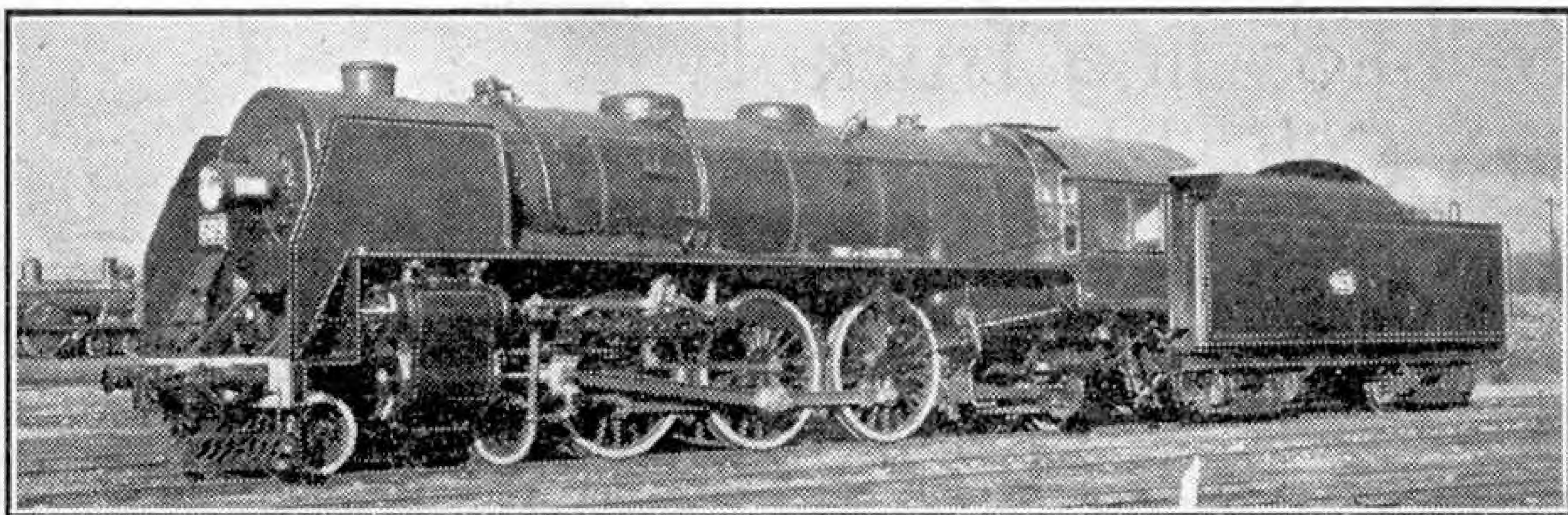
The self-loading oilfields truck can also act as a crane. The gin poles and other equipment needed are carried on the lorry and can quickly be assembled.

some 50,000 lb. On reaching the rear roller a heavy load will tip the truck up so that the front wheels are several inches clear of the ground, to drop back again as it is pulled forward.

The truck is also a very efficient mobile crane. When lifting is required tubular steel gin poles normally carried on its sides are pivoted in brackets at the rear of the truck and secured in position, as shown in our upper illustration, by means of chains. The winch cable passes through a snatchblock anchored to the platform and a crown block at the apex of the poles.



This self-loading oilfields Leyland diesel truck, built for the Shell group of companies, was one of the exhibits at the British Automobile and Cycle Show in New York in April last. Our illustrations are reproduced by courtesy of Leyland Motors Ltd.



An impressive 4-6-2 locomotive of the South Australian Government Railways. The illustrations and article are by courtesy of the Australian News and Information Bureau.

Australia's Railways

By Eric Rowell

WITH the exception of some 750 miles of lines, Australia's railways are government-owned. Of the 28,000 miles of railway in the country the States own and control some 25,000 and the Commonwealth Government 2,200 miles. The Commonwealth lines include those running into Central Australia, north from Port Augusta and south from Darwin, and a part of the line from Adelaide to Perth.

Australia's first railway lines were laid down long before the States joined in federation. The first line, opened in 1854,

By 1890 over 10,000 miles of track had been laid at a cost of over £1,000,000 (Australian).

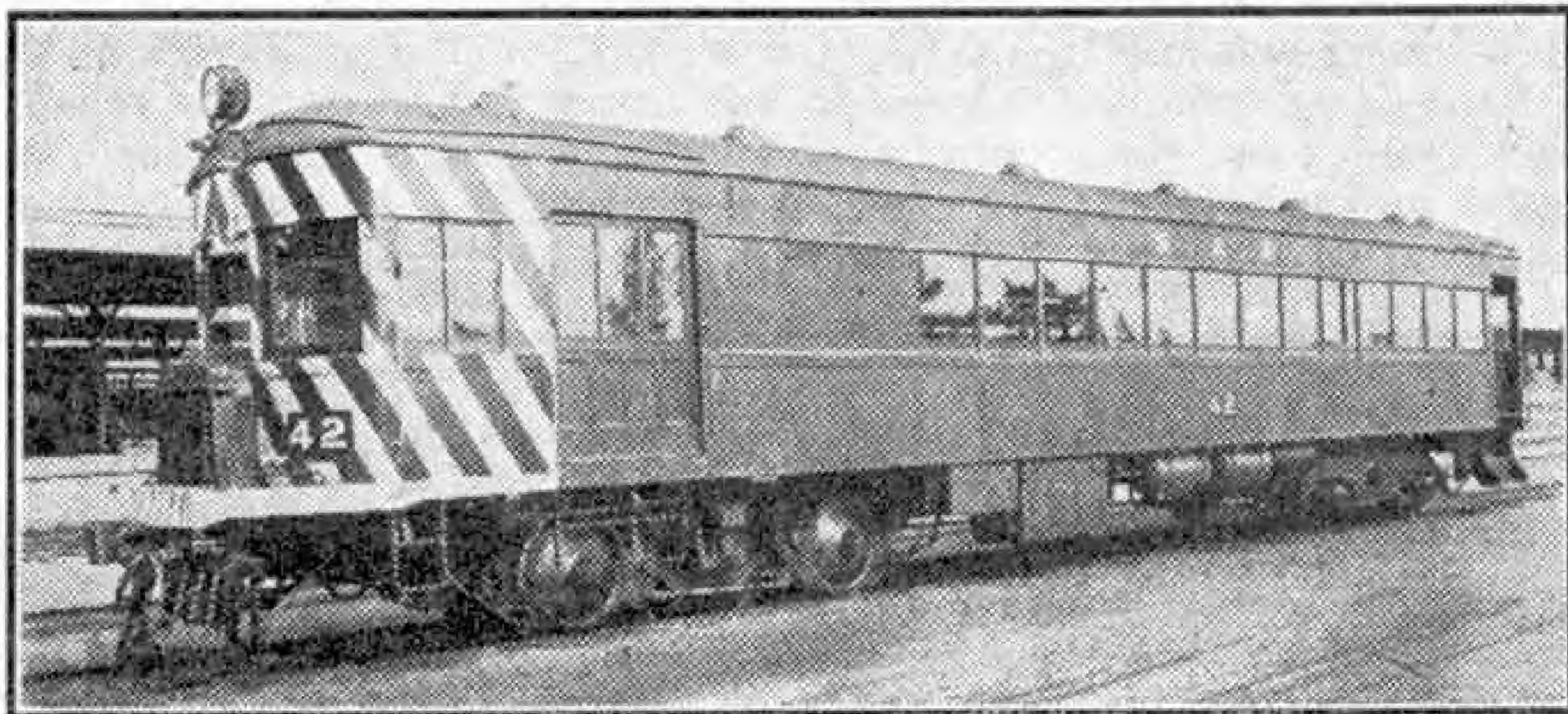
Before federation in 1901 there were six sovereign States in the country, and no Federal Government. The early colonists, doubtless awed by the immensity of the new country they lived in, regarded the few inhabited spots as extremely isolated entities, they did not foresee that one day the States would be linked. Railways themselves were as yet novel and, when built, were planned more with the object of advancing the individual

development of the States than as a means of national development.

An important result of this was that different States adopted different gauges. For instance, in New South Wales in 1850 an Irish engineer persuaded that State to plan for the Irish gauge of 5 ft. 3 in., and Victoria decided to fall in line. In 1883, however, the Irish

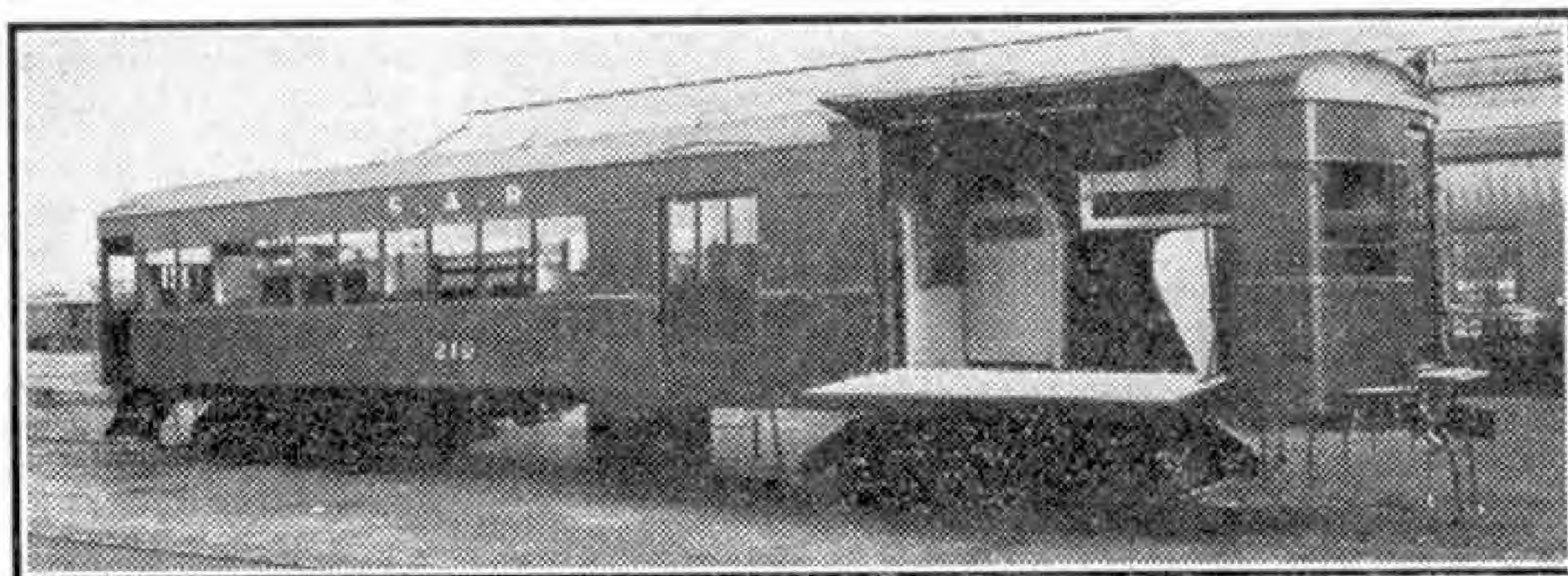
engineer resigned and was succeeded by a Scot, who recommended the standard 4 ft. 8½ in. gauge. The former Act was repealed by New South Wales without consulting Victoria, which had already ordered 5 ft. 3 in. locomotives and rolling stock.

To-day the position is that Victoria and



A petrol-driven rail-motor of the South Australian Government Railways. The striking painting on the front end renders the car more easily visible at road crossings.

was a 2½-mile track between Melbourne and Port Melbourne, then called Sandridge. This and a number of other railways built shortly afterward were owned and operated by private enterprise. Except in a few districts the railways have been the means of opening up the country, so that Government support was essential.



An unusual trailer car for rail-motor services. It has normal passenger accommodation, and in addition conveys horses in a special compartment.

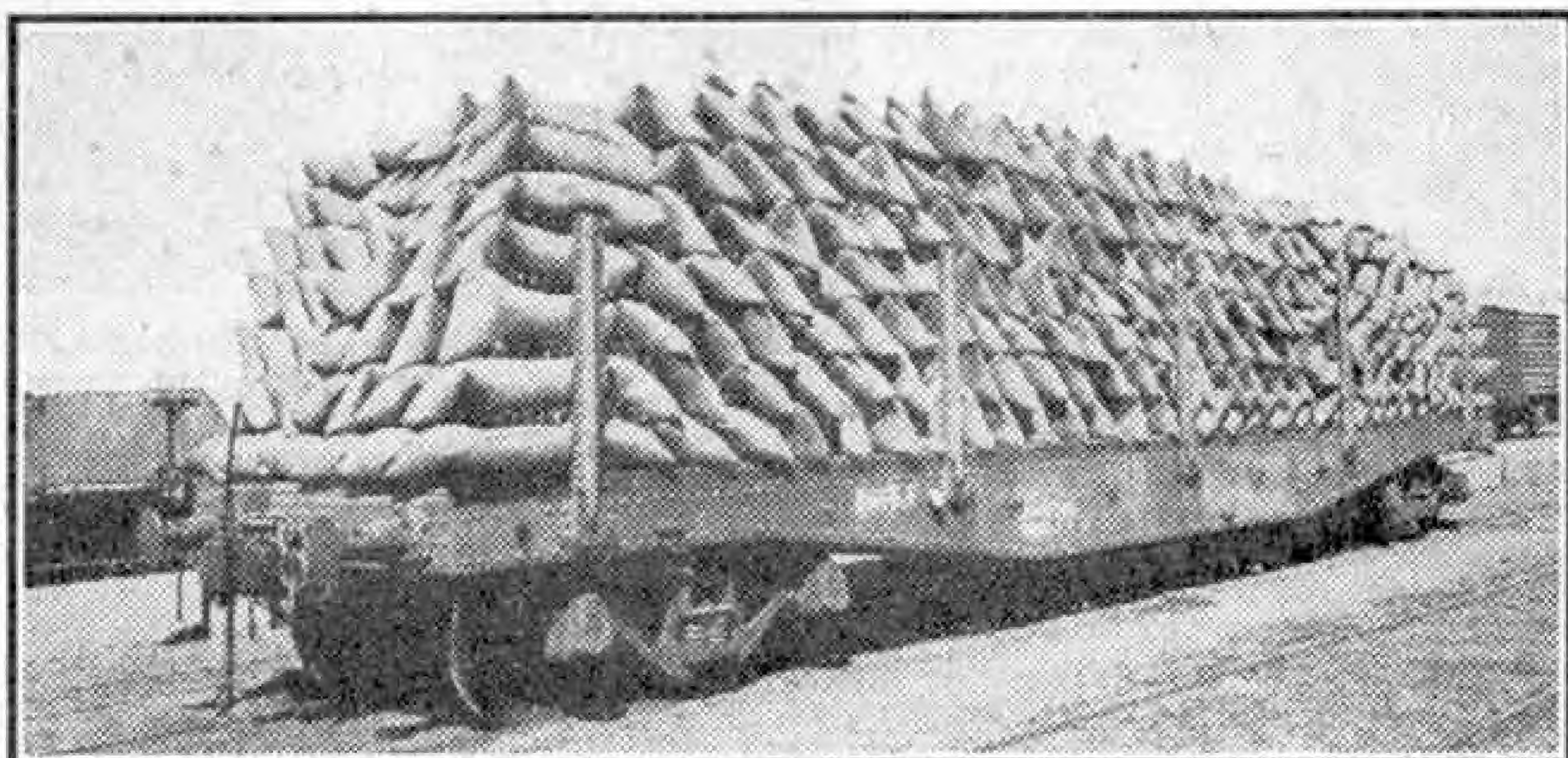
future standard for Australia as the result of the recommendations of a Royal Commission appointed in 1921 to consider unification of gauges for the railway.

Sir Harold Clapp's recommendations cover the standardis-

the greater part of South Australia have the broad 5 ft. 3 in. gauge, New South Wales has the standard 4 ft. 8½ in. gauge, and the railways in Queensland, the Northern Territory, Tasmania, Western Australia and the northern part of South Australia are of the narrow 3 ft. 6 in. gauge, which was originally laid down because it was less expensive to construct. This lack of foresight has of course resulted in inconvenience and waste of time and money. The break of gauge at the State borders makes trade more costly, and it presents a strategical weakness. During the last war it led to delays that might well have proved very grave.

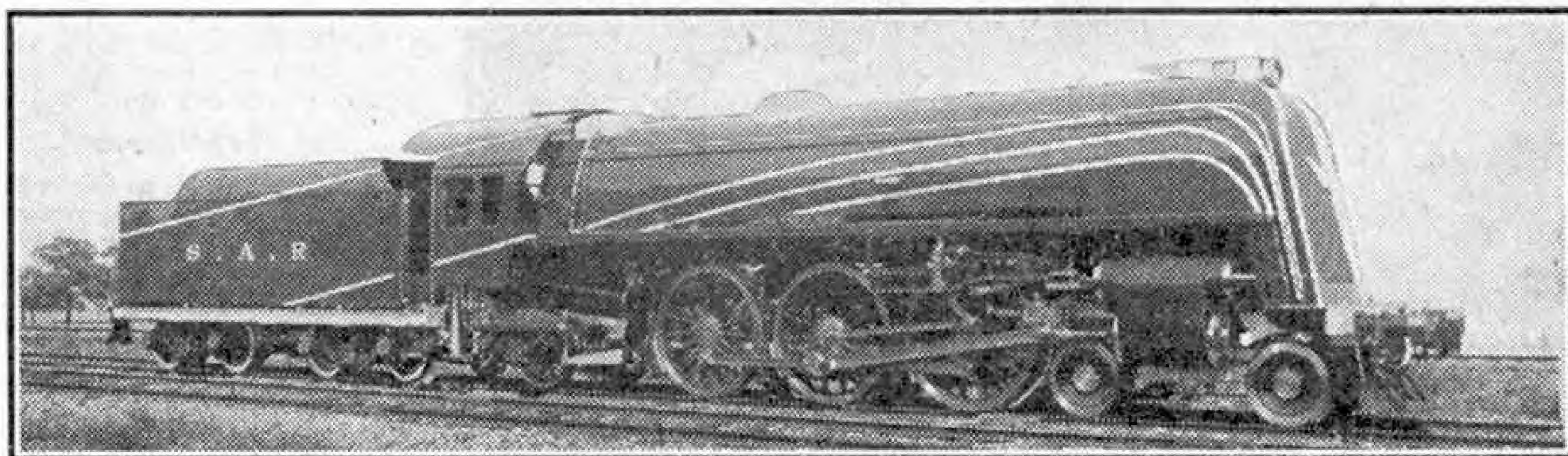
In 1944 Sir Harold Clapp, Commonwealth Director-General of Land Transport, was asked by the Federal Government to submit a report and recommendations on standardisation of lines, on the basis of the standard 4 ft. 8½ in. gauge. This gauge had already been accepted as the

ation of 8,470 miles of existing railways and the construction of 1,600 miles of new track, as well as the conversion or building of large amounts of rolling stock. They provide for a programme spread over 11 years, employing 12,500 skilled men—a huge conversion task that constitutes the greatest single engineering project in



Australian wheat loaded in bags on a heavy-duty flat car. There are 688 bags in this consignment.

the Southern Hemisphere. It is planned so that during conversion no main line will be out of commission longer than over a week-end, and no branch line out of use longer than a week, so that the least possible inconvenience shall result.



Streamlined express locomotive "Sir Winston Dugan."

Air News

By John W. R. Taylor

500 m.p.h. British Flying Boat

A six-jet sweptwing flying boat, able to carry 74 passengers for 1,500 miles at a cruising speed of 500 m.p.h., has been designed by Saunders-Roe Ltd., of Cowes, Isle of Wight, and is being considered by Tasman Empire Airways for routes such as that between Australia and New Zealand.

The new flying boat, which will be known as the "Duchess," will be powered by six de Havilland "Ghost" engines and will be not only faster than any air liner flying to-day but the most economical medium-range aircraft in the world. The cost per passenger-mile will be just over one penny for stage lengths of 1,300-1,500 miles, and two-pence over 2,000 mile ranges. These rates are cheaper than British rail fares.

The all-metal "Duchess," small sister to the giant long-range "Princess" boats being completed by Saunders-Roe for B.O.A.C., will have an all-up weight of 58 tons and wing span of 135 ft. 6 in. The whole of the passenger accommodation will be pressurised and air conditioned.

First Australian Aero Engine

The Commonwealth Aircraft Corporation have started tooling up for quantity production of the "Cicada," first aero engine wholly designed and developed in Australia.

Named after the Australian locust, the "Cicada" will power the new three-seat CA-22 basic trainer aircraft, now in prototype construction at the C.A.C. factory. It is a seven-cylinder radial, able to develop 450 h.p. for take-off, and has been built to R.A.A.F. specifications. C.A.C. experts claim that one of its features will be much lower noise level than present engines of similar power.

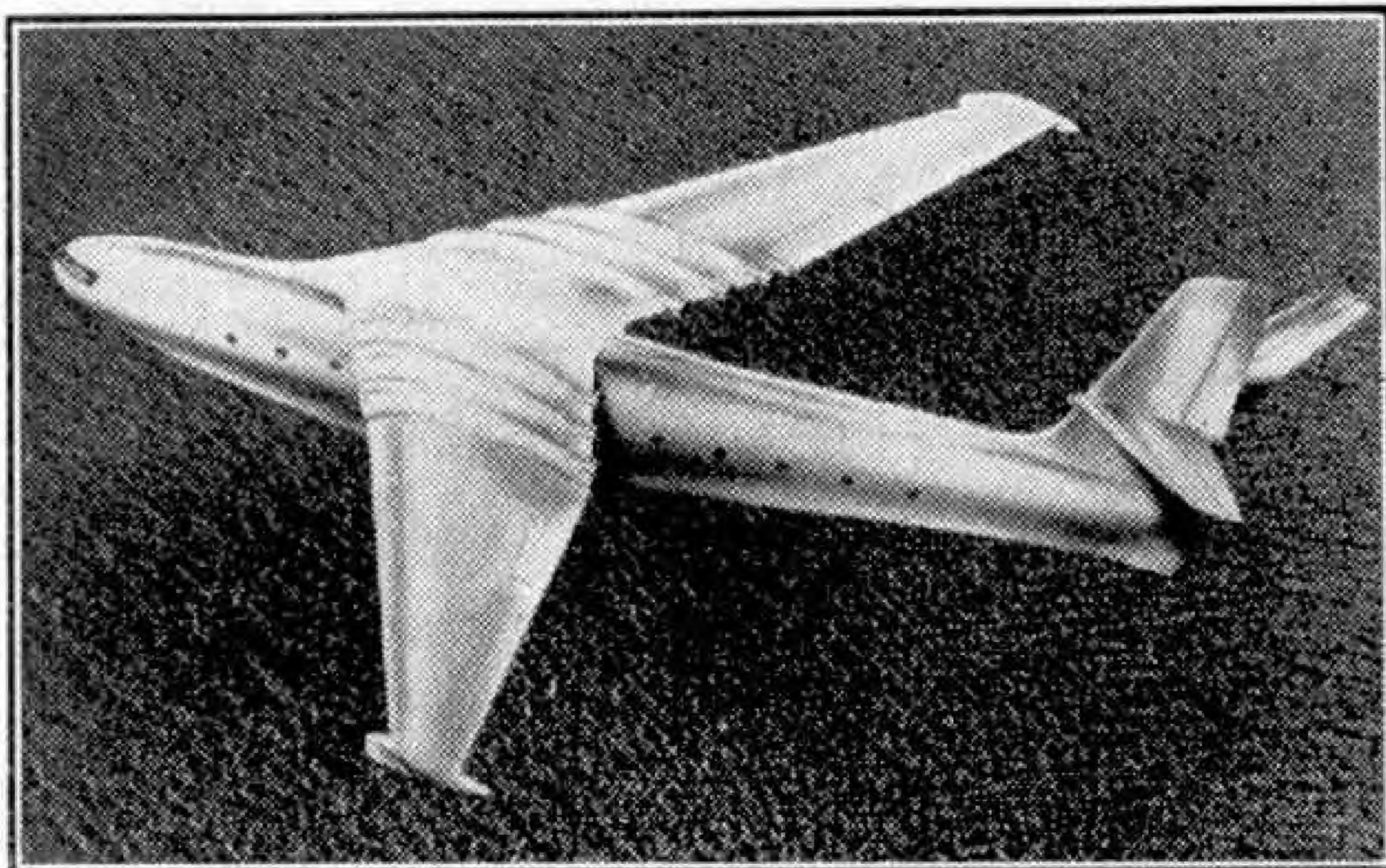
Big Orders for New U.S. Air Liner

The first quantity orders for a new type of American twin-engined air liner in more than three years have

been announced by the Presidents of Eastern Air Lines and Trans-World Airline, who have ordered 65 Martin 4-0-4s from the Glenn L. Martin Company. The two transactions, 35 aircraft for E.A.L. and 30 for T.W.A., involve about \$35,000,000.

The new model 4-0-4 has been developed from the Martin 2-0-2 and will carry 40 passengers in a pressurised cabin. The aircraft ordered by E.A.L. and T.W.A. will be powered initially by two 2,400 h.p. Pratt and Whitney piston engines, but these may be replaced in three or four years time by "propjets."

Deliveries will begin next Spring. To tide them over until then, T.W.A. are leasing from Martin twelve 36-passenger 2-0-2s to supplement their fleet of 61 Lockheed "Constellations."



Model of Saunders-Roe's new 500 m.p.h. "Duchess" flying boat. Photograph by courtesy of Saunders-Roe Ltd.

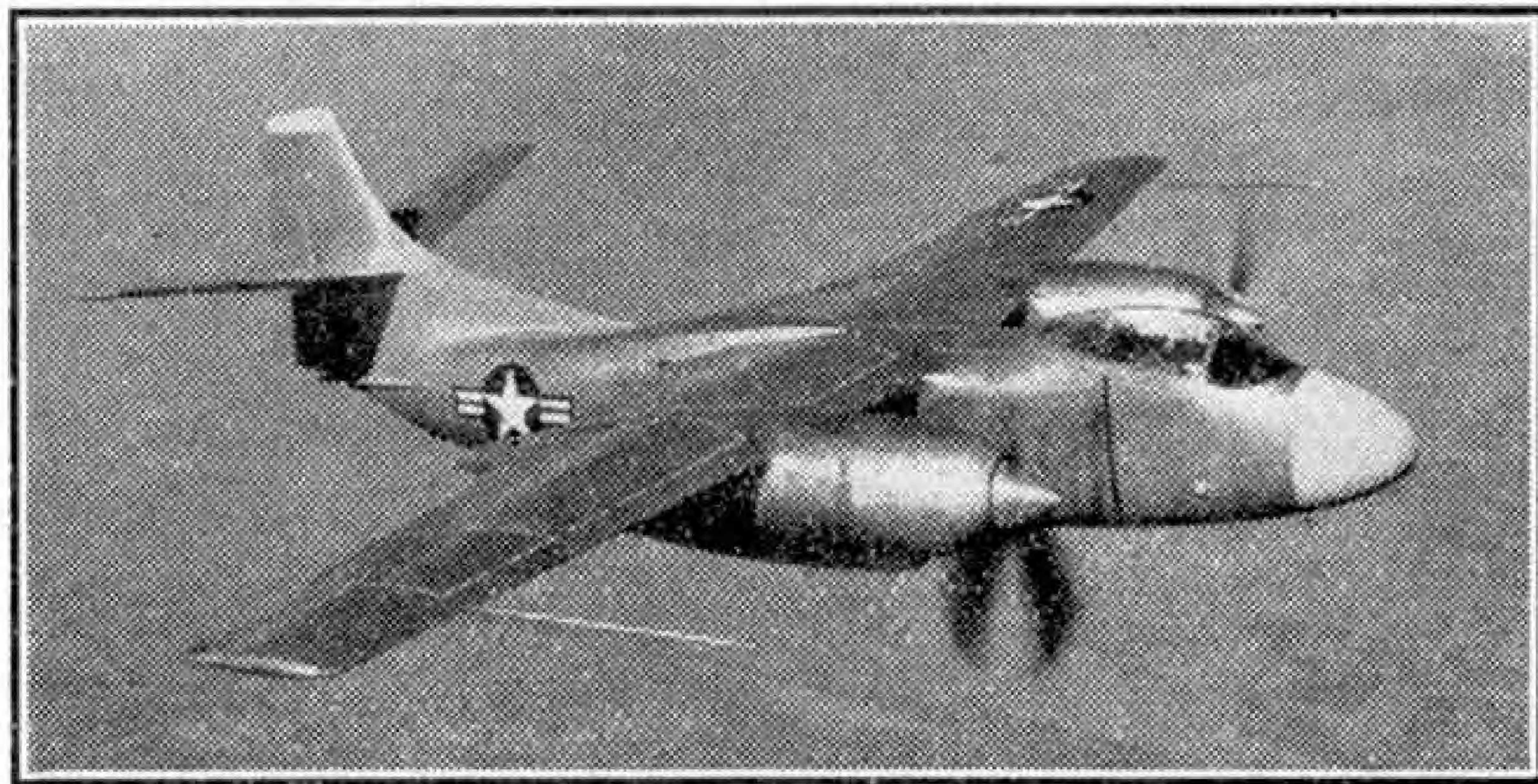
Naval Atom-Bomber

The first Naval aeroplane designed to carry an atomic bomb is the North American AJ-1, now in production for the U.S. Navy and shown in the lower photograph on this page. Although only its two Pratt and Whitney "Double Wasp" engines are visible, it is actually a three-motor machine, with a General Electric jet engine hidden away in the tail of its fuselage. As a result it is much faster and able to carry a heavier bomb load than any present-day carrier-based bomber.

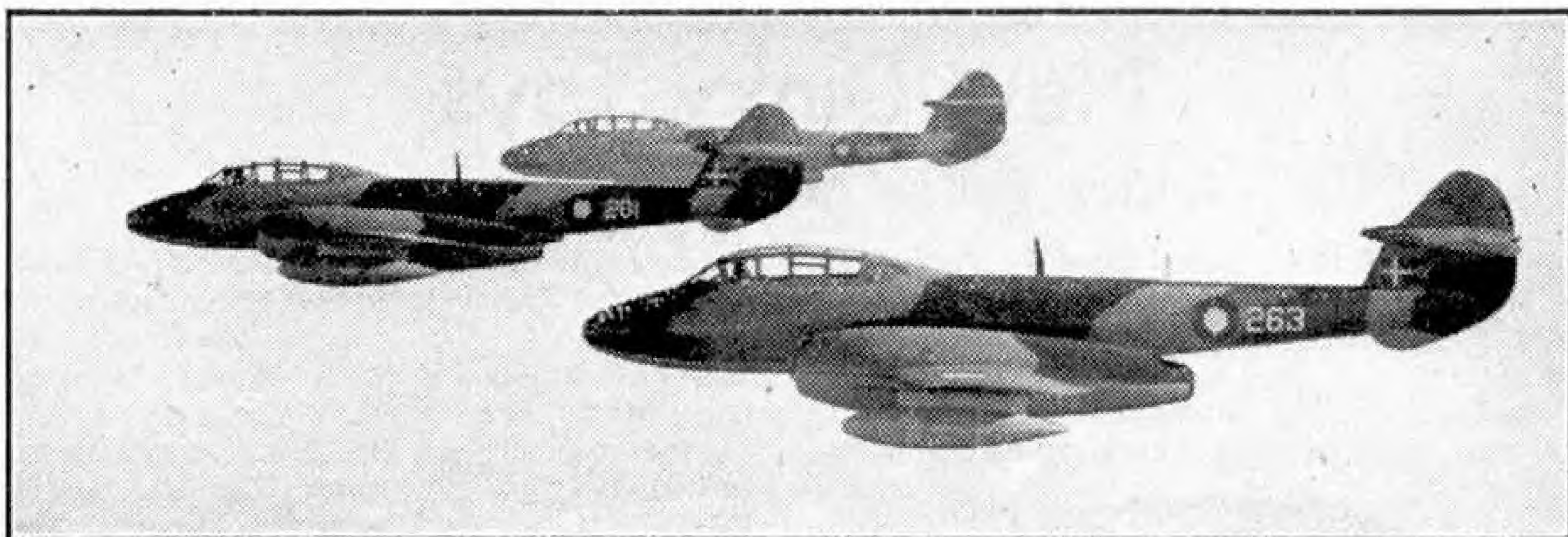
The AJ-1, which carries a crew of three in a pressurised cockpit, is designed to operate solely on its piston engines for normal flight, the main purpose of the jet being to provide extra power and speed under combat conditions. The only other details of the AJ-1 that can be mentioned are that its outer wing panels fold in-board and its fin folds flat to facilitate handling and stowage aboard ship.

The "Tay-Viscount"

The second prototype Vickers "Viscount," powered by two Rolls-Royce "Tay" jet engines, flew for the first time at Wisley, Surrey, on 15th March last, piloted by Mr. G. R. Bryce. Apart from its power-plants, it is similar to the well-known four-"Dart" prototype "Viscount" which is in production for B.E.A.



North American Aviation AJ-1, the first Naval aircraft designed to carry an atomic bomb. Photograph by courtesy of North American Aviation, U.S.A.



Gloster "Meteor" 7 jet trainers have been ordered by the Danish Government, and the first three machines are seen here in flight, piloted by members of the Danish Air Force. Photograph by courtesy of Gloster Aircraft Co. Ltd.

A New "Parasite"

The U.S.A.F. are reviving plans to provide their giant B-36 bombers with personal defence "parasite" jet fighters. Earlier tests with McDonnell XF-85 "Goblin" jet fighters failed because these aircraft were designed to fit inside the B-36's bomb-bay and were, consequently, so small that they were tricky to fly.

This time, the U.S.A.F. plan to carry two full-size Republic F-84 "Thunderjet" fighters under the wings of the bomber. They would be attached before take-off, complete with their pilots, the idea being that if the bomber were attacked by enemy fighters over its target, beyond the range of normal fighter escort, the F-84s could be dropped from their mountings to engage the enemy and then fly back to the nearest friendly base.

Night Flights to Switzerland

Following the tremendous success of their reduced-fare night services to Paris, British European Airways have started similar cheap night excursions to Switzerland, in association with Swissair. The B.E.A. service leaves Northolt at 11.56 p.m., reaching Geneva at 2.45 a.m.; the Swissair service leaves at 1.16 a.m., arriving Zurich at 3.25 a.m. The return flights on which the reduced fares apply leave Geneva at 3.55 a.m. and Zurich at 9.30 p.m.

The night excursion return fares are £21 for Geneva and £22 for Zurich, representing savings of £7 and £8 respectively compared with normal fares. They are valid for 23 days.

Wing-Tip Gun Turrets

Wing-tip gun turrets, interchangeable with the detachable wing-tip fuel tanks now carried by many warplanes, are expected to be ready for U.S.A.F. flight testing towards the end of this year.

Such turrets should weigh much less than the usual type of fuselage turret, and will give a greatly improved sighting coverage. Furthermore, removal of turrets from the fuselage will make room for fuel or operational equipment.

"Flying Vet"

Following the success of her long-established "flying doctor" service, Australia is planning to start a "flying vet" service for the benefit of livestock in the Western division of New South Wales. Experts of the N.S.W. Ministry

for Agriculture are examining details of the proposed service, which will compensate for the shortage of trained veterinary inspectors and surgeons.

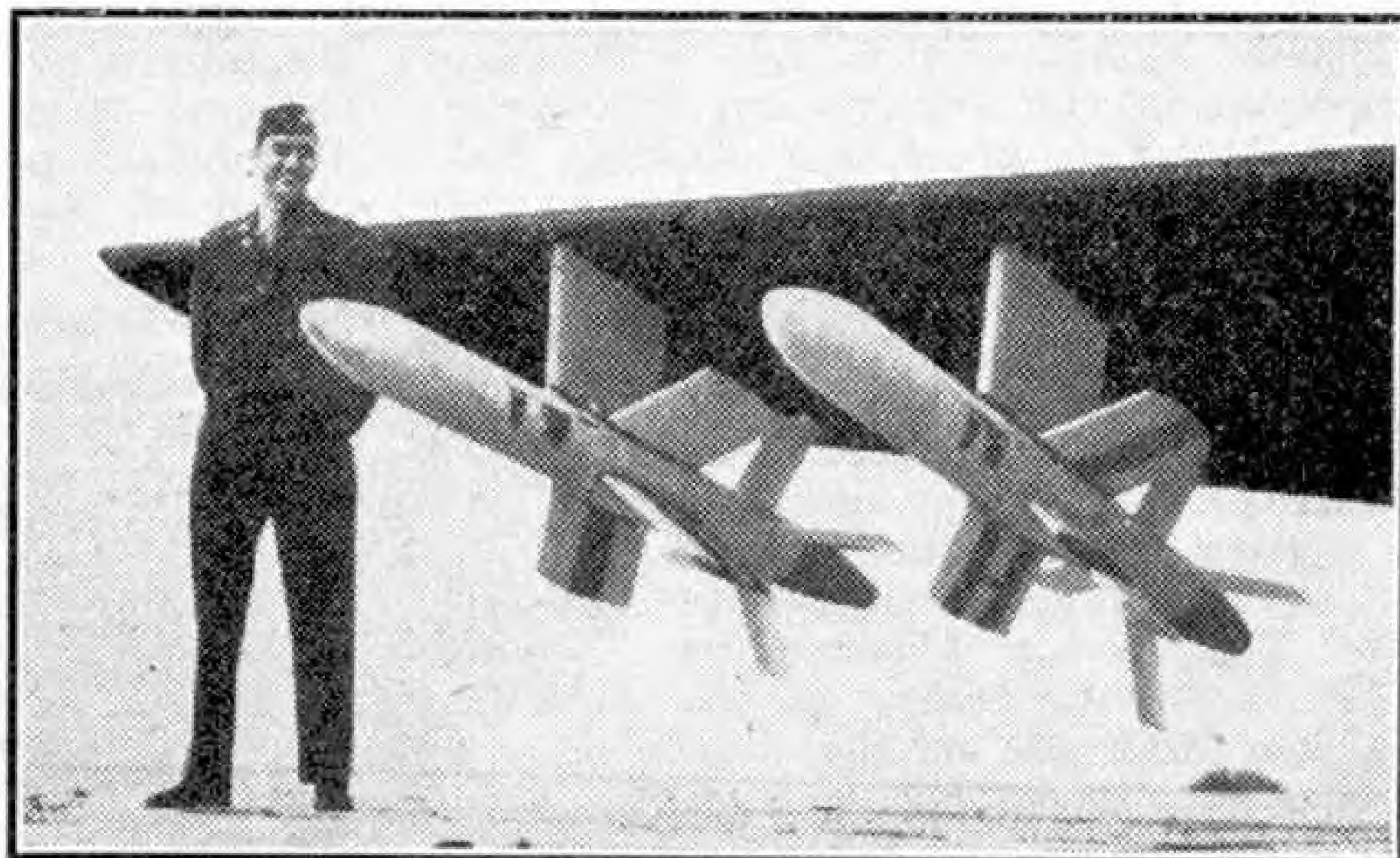
New U.S. Guided Missile

The Ryan "Firebird," illustrated on this page, is the first American air-to-air guided missile of which details have been released for publication. It is a rocket-propelled fragmentation shell with almost human intelligence, able to "home" on to any target by means of its radar "brain."

The "Firebird" itself will not go into production, but is being used to test equipment and ideas that will be built into newer and even more efficient missiles. As a start four "Firebirds" were fired last year from a "Twin Mustang" fighter at Holloman Air Force Base, Alamogordo, New Mexico.

An advantage of this type of anti-aircraft weapon is that it can be launched from a fighter plane at ranges well beyond the defensive fire of any bomber under attack. By night or in bad weather, the pilot of the "mother" plane need not even be able to see his target. As long as he knows approximately where it is, he can launch the rocket in that general direction and its radar will do the rest, guiding it swiftly and relentlessly to the target.

United Helicopters Inc., the world's largest manufacturers of commercial rotating wing aircraft, have changed their name to "Hiller Helicopters" to avoid confusion with United Aircraft Corporation, makers of Sikorsky helicopters.



Two Ryan "Firebird" air-to-air guided missiles under the wing of a U.S.A.F. "Twin Mustang" fighter.

New Dinky Toys

A Fine Range of Cars and Lorries

A STRIKING new Dinky Toy this month is the new Hudson Commodore Sedan. The prototype of this attractive miniature is a well-known and impressive American car for which there is a choice of two engines, the 121 h.p. Super 6 or



Morris Oxford Saloon, Dinky Toys No. 40g.

the 127 h.p. Super 8, and three body styles. The Sedan, the one chosen for reproduction, is roomy enough to carry six passengers comfortably.

In outward appearance it is modern in style, with a typical American horizontal grille in front. The body is large and long, with the fenders or bumpers absorbed into it, and on the sides there are embossed speed lines designed to give the appearance of forward motion, even when the car is standing still.

These characteristics are splendidly displayed in the Dinky Toys miniature, No. 139b. Two models are available, one in blue, with the top of the body and the wheels in stone colour, and the other in cream with dark red top and wheels. This new Hudson will be welcomed by all Dinky Toys enthusiasts, particularly by those who specialise in modern American productions.

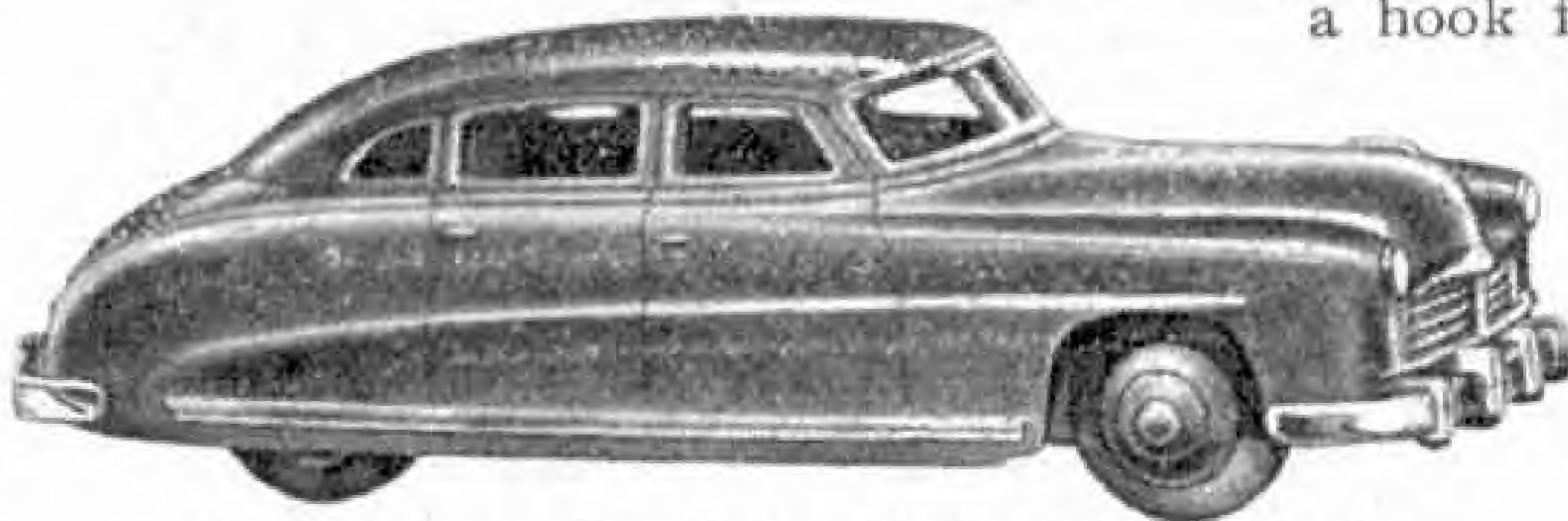
The Land-Rover, Dinky Toys No. 27d, is an outstanding addition to the series, as can be seen from the middle illustration on the opposite page. It shows splendidly the great strength of construction of the original Land-Rover, which is

intended to go anywhere and do almost anything. This vehicle has several remarkable features. The top of the large flat bonnet, which is easily lifted by two handles at the front, gives easy access to the engine. At the front there is an unusually strong bumper bar, and above it is a strong steel screen to protect the radiator and headlamps. The driver is provided with a bucket seat in the front compartment of the vehicle, with a tool box on the left; and in the rear section there is accommodation for four passengers. The seats in this section are arranged at the sides and they can be removed when it is necessary to make use of the entire space for load carrying.

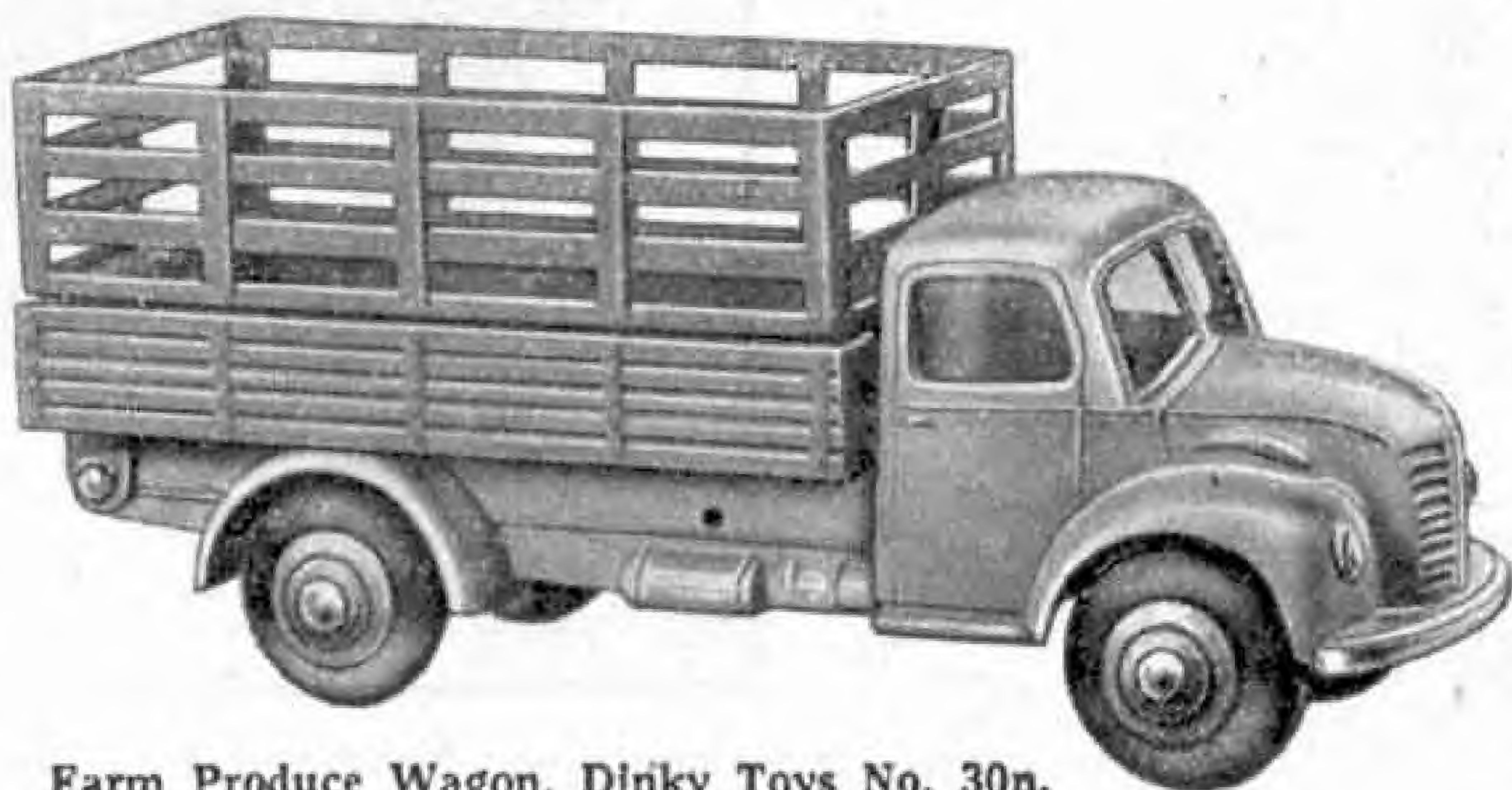
The spare wheel is mounted behind the partition between the compartments, resting in a shallow depression in the floor. At the back is a tailboard for use in loading and unloading, below which is a hook for towing purposes.

As many as possible of these features are reproduced on the model, which has the striking and original appearance of the real Land-Rover. In

addition there is a representation of one of the most important items in the equipment of the actual vehicle, namely the power take-off gear box and wide belt pulley at the rear. This converts the Land-Rover into a mobile power unit that can go anywhere to take up a job. Through its power take-off it can be harnessed to a great variety of machines,



Hudson Commodore Sedan, Dinky Toys No. 139b.



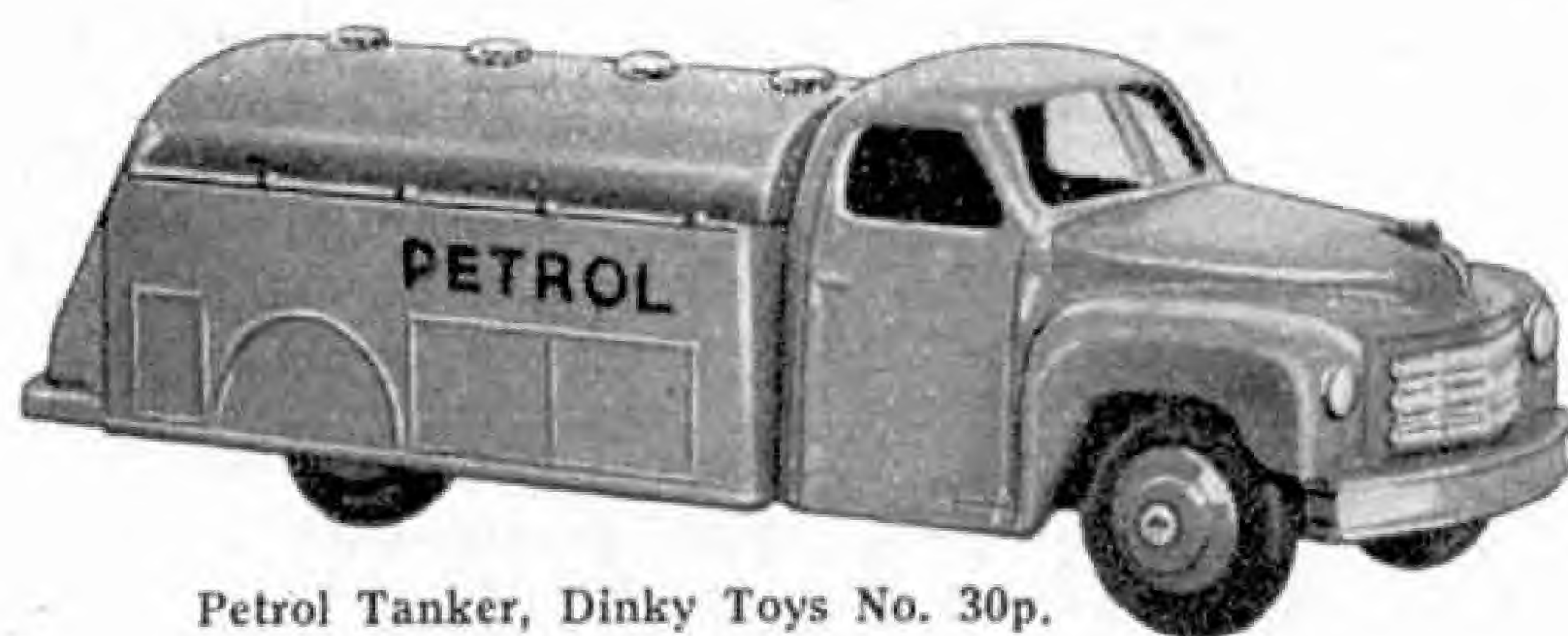
Farm Produce Wagon, Dinky Toys No. 30n.

such as a thresher, an elevator or a chaff cutter.

Further interesting features of the model are the indications of its side doors and of the 10-gallon petrol tank below that on the offside. This unusual miniature is a splendid addition to the series. Models in two colours, orange with blue inside and green with a stone interior, are available. The prototype can be used for a wide variety of purposes, and correspondingly owners of Dinky Toys layouts will find plenty of opportunity for making good use of it.

The top illustration on the opposite page is a miniature of the Morris Oxford, a car that on its introduction was a distinctive novelty for the well-known Morris organisation. It has a 1,476.5 c.c. engine developing 40.5 b.h.p. at 4,200 r.p.m., with steering column gear change, torsion bar independent front suspension hypoid rear-axle and many other features that make it modern in every way. The car is also completely modern in style, as a glance at the front shows, for it has a massive horizontal grille and bumper, with the new style wings in which the headlamps are sunk. These striking features are well reproduced in the handsome miniature, Dinky Toys No. 40g, which has a saloon body beautifully finished in green or stone colour, and makes a splendid addition to the range of private cars available for the Dinky Toys enthusiast.

Turning now to the latest commercial



Petrol Tanker, Dinky Toys No. 30p.

vehicles of the series, the first that calls for consideration is the Farm Produce Wagon, Dinky Toys No. 30n. This is illustrated at the foot of the opposite page, and a glance reveals its purpose. The chassis is based on the well-known Dodge



Austin Wagon, Dinky Toys No. 30j.

Truck and on it is mounted a body with high latticed sides and ends, so that it is particularly suitable for carrying bulky loads of the kind that farm vehicles are so often required to accommodate. It

is finished in green and yellow, also in yellow and green.

The second of our new commercial vehicles is a miniature of a well-tried lorry or truck that must be familiar to every reader. This is the low sided Austin Wagon, Dinky Toys No. 30j, which is recognisable immediately from the splendid reproduction of the characteristic radiator grille. This is finished in black. Two

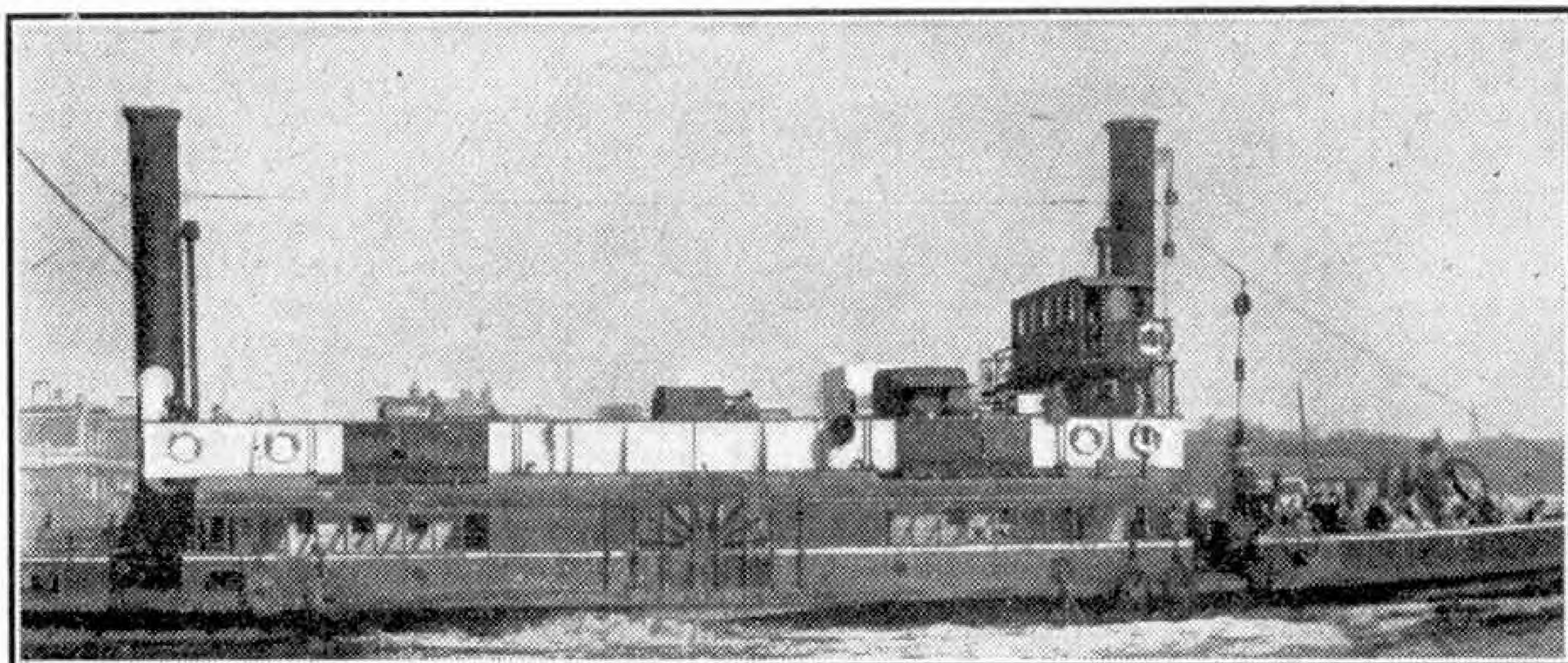


Land-Rover, Dinky Toys No. 27d.

colour schemes are available. In one the body and chassis are in an attractive shade of blue, and the wheel centres are light blue in colour. In the other the colour is dark red throughout.

Lastly we come to another special purpose vehicle, Dinky Toys Petrol Wagon, No. 30p, a very imposing production. It is available in two colours, bright red and green, with a front bumper and radiator grille in aluminium finish, and it is decidedly modern in shape, with a well sloped back. On top of the tank itself are representations of four domes or covers, each of them aluminium in colour.

The handsome and impressive appearance of this model alone makes it very desirable, and it has also the advantage of being of the greatest value on any kind of Dinky Toys layout, particularly one of which a garage forms part, as so often is the case. Petrol pumps at such garages have to be filled, and here is the vehicle to be used for the job. The Dinky Toys Petrol Wagon indeed will add the greatest realism to any play scheme.



The "Squires" crossing the Thames.

The Woolwich Ferry

By W. Philip Conolly

THE Woolwich Free Ferry, and its steamers that maintain a service between Woolwich on the south bank of the Thames and North Woolwich on the opposite shore, provide a much favoured place of resort for many of the juvenile population of the eastern parts of London. This ferry, which is maintained by the London County Council, and the British Railways ferry service plying between Tilbury and Gravesend are the only means of communication on the surface for vehicles and pedestrians from shore to shore "below bridges," that is anywhere downstream from Tower Bridge, though there are in addition several tunnels connecting the north and south banks of the river. Two of these are vehicular, one at Rotherhithe and the other at Blackwall. Two others are for foot passengers only, one at Greenwich and another at Woolwich, the latter lying immediately below the line of the Woolwich Free Ferry.

There seems to have been a ferry crossing the river at Woolwich from a period as remote as the early part of the 14th century, but whether the service has been an unbroken one since that time is not a little doubtful. In 1811 a ferry was established just a little lower downstream than the site of the present one. This was used by the military authorities to assist in the distribution of artillery from Woolwich Arsenal on the south bank to various parts of Essex.

The introduction of powered vessels on

the Woolwich service belongs to comparatively modern times and it was on 23rd May 1889 that the first steam ferry boat "*Gordon*" made the inaugural crossing. Upon completion of this Lord Rosebery was able to declare on behalf of the L.C.C. that the ferry was open as a free service to the public.

Some details of the work of the present day vessels may be of interest. There are four boats in all, but only two are in use at any one time, the other pair being in reserve. In 1939 there was a three-boat service between the hours of 6 a.m. and 11 p.m., but the present service is a two-boat one terminating at 9 p.m. In 1939 the numbers of passengers and vehicles carried daily were 21,000 and 2,800 respectively, but ten years later the corresponding figures had dropped to 12,500 and 1,400.

The Thames has a width at the ferry of 1,000 ft. between the landing stages, and on each trip any one of the vessels is capable of carrying 1,000 passengers and, in addition, vehicles having a total weight of 100 tons. Vehicles are transported on an upper deck, while pedestrians occupy the lower or main deck.

The existing vessels were all built by Samuel White and Co. Ltd. at Cowes, Isle of Wight, one in 1922, the second in 1923 and the other two in 1930. Each is 166 ft. in length and has a width of 44 ft., while its gross registered tonnage is 750. The engines are of 600 h.p. and drive paddles.

New Meccano Model Perforating Machine

CONSTRUCTION of the model perforating machine shown in Fig. 1 should be begun by bolting two $12\frac{1}{2}$ " Strips and two $12\frac{1}{2}$ " compound strips to a $5\frac{1}{2}$ " \times $21\frac{1}{2}$ " Flanged Plate that forms the base of the model. The compound strips are built up from two $5\frac{1}{2}$ " and one $2\frac{1}{2}$ " Strip, and each side of the model is filled by a $5\frac{1}{2}$ " \times $21\frac{1}{2}$ ", a $4\frac{1}{2}$ " \times $21\frac{1}{2}$ " and a $2\frac{1}{2}$ " \times $21\frac{1}{2}$ " Flexible Plate. The sides are extended upwards by a $2\frac{1}{2}$ " Strip 1 and a Semi-Circular Plate, and are braced by two $2\frac{1}{2}$ " Strips attached to them by Angle Brackets. A $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Curved Plate and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate complete the top.

The press bed consists of a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate and is attached to the $5\frac{1}{2}$ " Strips 2 and $12\frac{1}{2}$ " Strips by Angle Brackets.

The model is driven from the handle 3 formed by attaching a $\frac{3}{4}$ " Bolt to a 3" Pulley. The Pulley is locked on a $1\frac{1}{2}$ " Rod passed through a Reversed Angle Bracket 4 and a Flat Trunnion. A $\frac{1}{2}$ " Pinion on this Rod engages with a 57-tooth Gear Wheel 5, which is fast on a $3\frac{1}{2}$ " Rod 6 mounted in two $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips. Rod 6 carries on its end a Bush Wheel to which a $2\frac{1}{2}$ " Strip 7 extended by a Fishplate, is pivotally attached.

The perforating tools are two 2" Rods, which are fixed by Spring Clips in a sliding

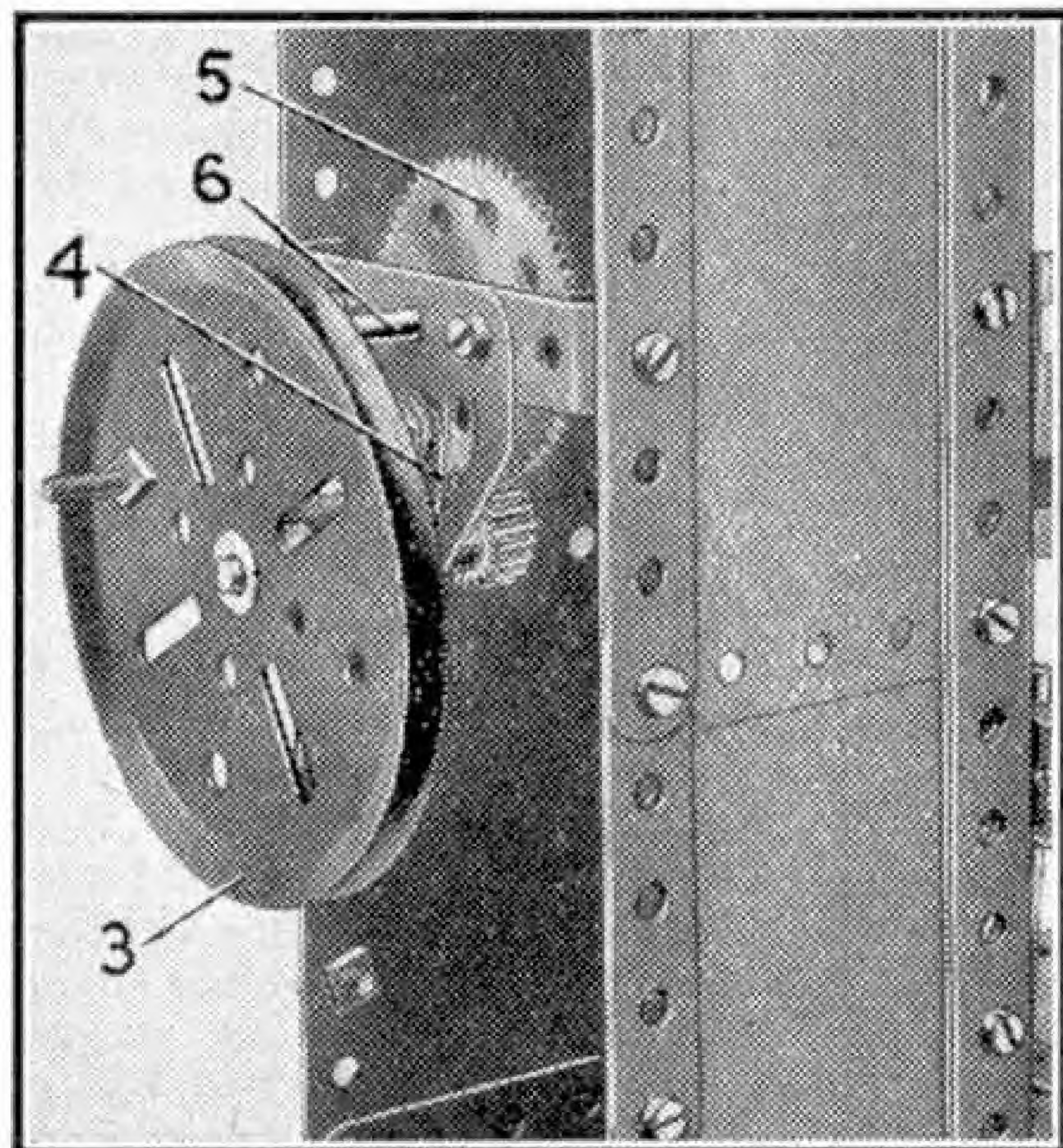


Fig. 2. A rear view of the perforating machine showing the driving arrangement.

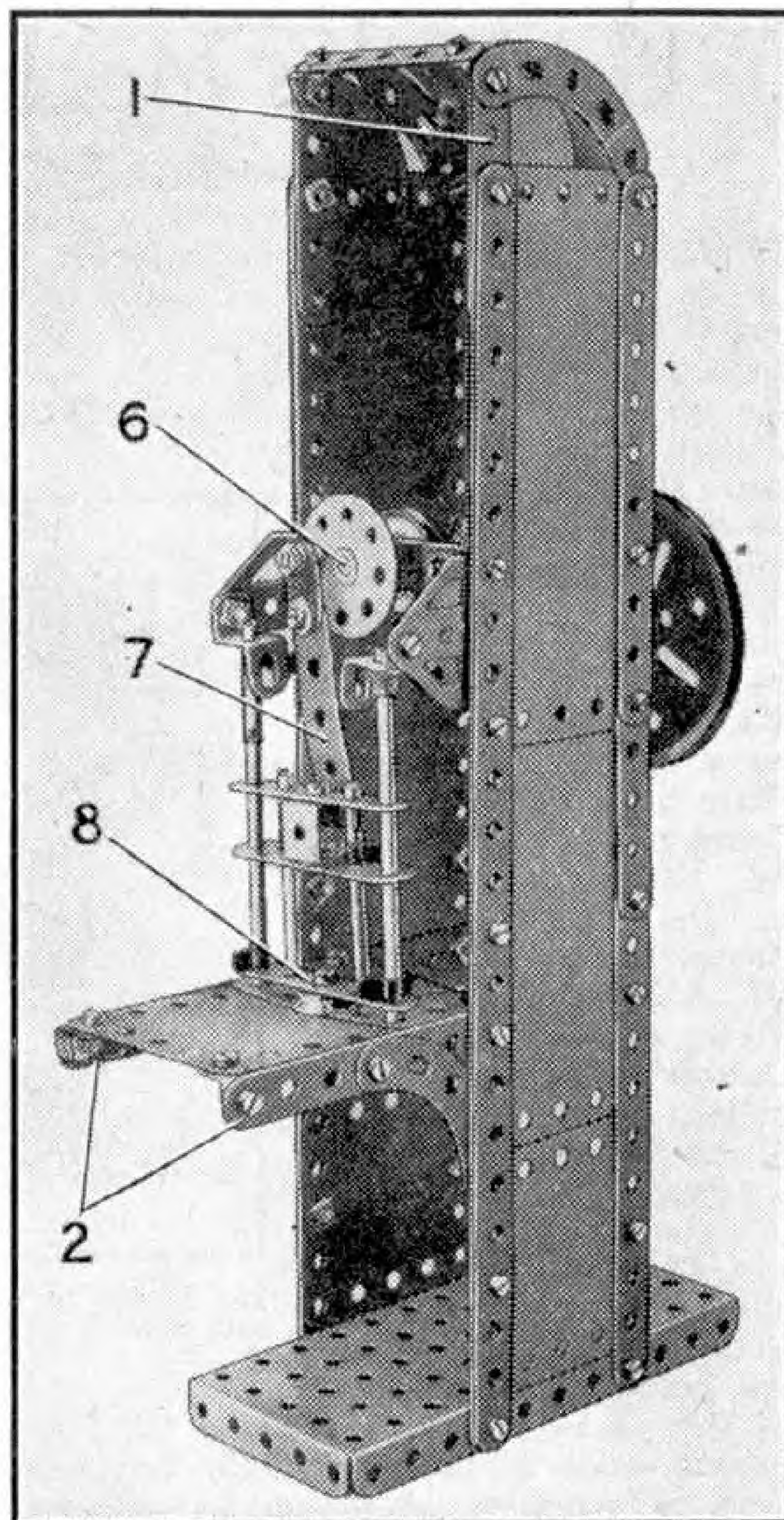


Fig. 1. A simple perforating machine suitable for operation from a Magic Motor.

head consisting of two $2\frac{1}{2}$ " Strips connected by two Double Brackets. The head slides up and down two guides consisting of 4" Rods held at the lower ends in the $2\frac{1}{2}$ " Strip 8 by Spring Clips and at their upper ends in Reversed Angle Brackets by a Cord Anchoring Spring and a Rod Connector. The Strip 8 is spaced from the press bed by a $\frac{1}{2}$ " loose Pulley. The rear Double Bracket in the sliding head is pivotally attached by means of a lock-nutted bolt to the lower end of the $2\frac{1}{2}$ " Strip 7.

Parts required to build model Perforating Machine:
2 of No. 1; 6 of No. 2; 9 of No. 5; 1 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 15b; 1 of No. 16; 2 of No. 17; 1 of No. 18a; 1 of No. 19b; 1 of No. 22; 1 of No. 23; 1 of No. 24; 1 of No. 26; 1 of No. 27; 6 of No. 35; 50 of No. 37; 6 of No. 37a; 6 of No. 38; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 2 of No. 111c; 3 of No. 125; 2 of No. 126; 1 of No. 126a; 1 of No. 176; 2 of No. 188; 2 of No. 190; 2 of No. 191; 2 of No. 192; 2 of No. 200; 1 of No. 213; 2 of No. 214.

Using the Meccano Gears Outfit

A Hammerhead Crane for Outfit No. 6

THE hammerhead crane shown in Fig. 1 is built from a No. 6 Outfit and uses gears from a Gears Outfit "A." The construction of the model is begun with the jib, which is built up as follows. Two girders, each consisting of two $12\frac{1}{2}$ " Angle Girders overlapped two holes, are joined at one end by a $3\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip 1 and at the other by a $3\frac{1}{2}$ " Strip. The ends are extended downward by a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and two $2\frac{1}{2}$ " Strips. Compound strips 2 and $5\frac{1}{2}$ " Strips are attached to the $2\frac{1}{2}$ " Strips and connected by $5\frac{1}{2}$ " Strips 18. A $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and a $3\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip 3 are bolted between the $5\frac{1}{2}$ " Strips 18, and a 3" Pulley is fixed boss downward to the Flanged Plate, the $\frac{1}{2}$ " Bolts holding it having Collars on their shanks. Two $12\frac{1}{2}$ " Strips are bolted along the top of the jib and are attached to the compound angle girders by Angle Brackets. Cord is arranged as shown to represent girder bracing.

The Motor is bolted to one of the

compound angle girders and is attached to the other girder by a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. A $\frac{3}{4}$ " Contrate Wheel on the Motor shaft meshes with two $\frac{3}{4}$ " Pinions fixed face to face on a $6\frac{1}{2}$ " Rod 4 (Fig. 3)

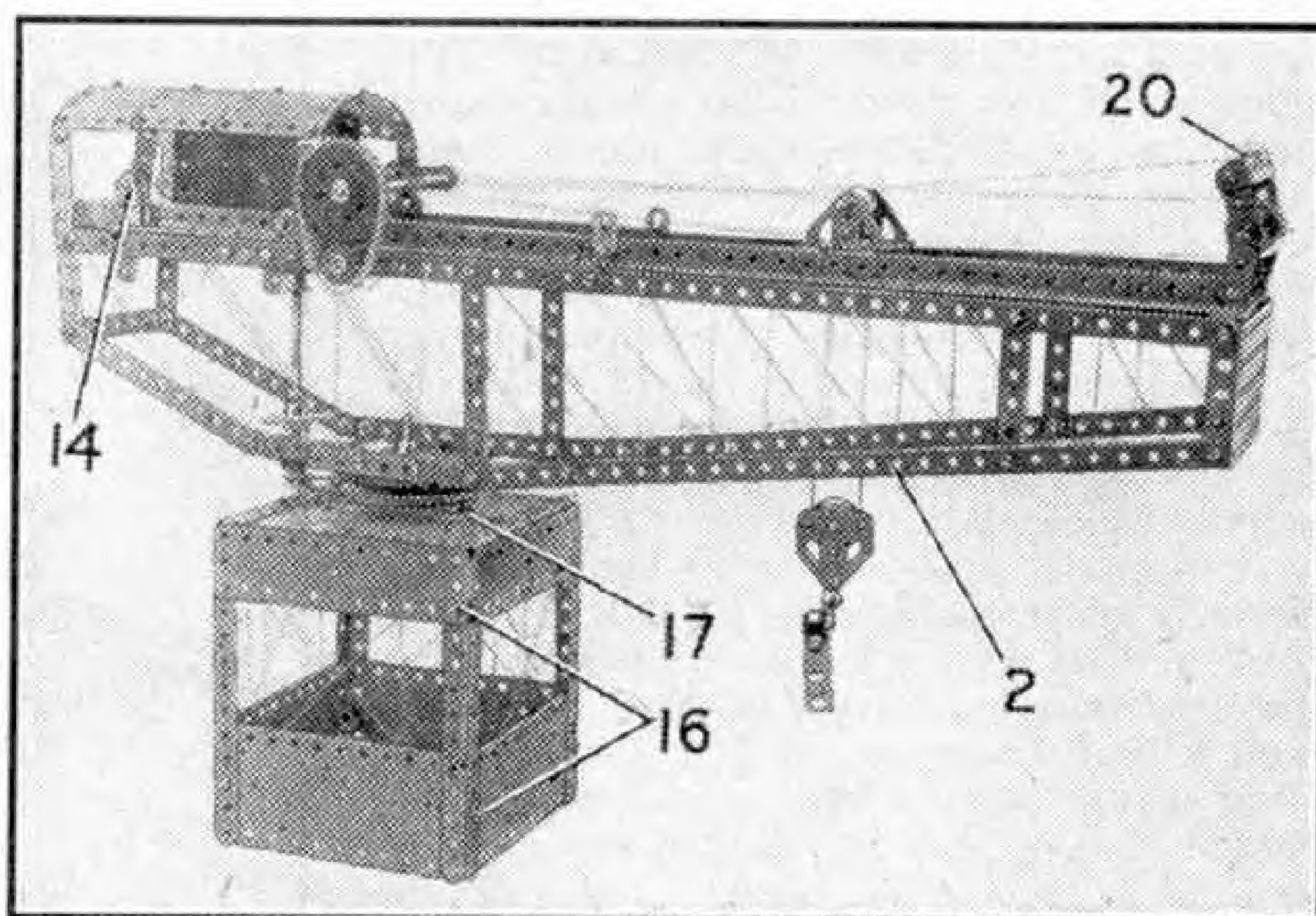


Fig. 1. All the movements of this fine hammerhead crane, which is built with Outfit No. 6, are driven by a No. 1 Clockwork Motor through the gears included in Gears Outfit "A."

This Rod carries a $\frac{1}{2}$ " Pinion 5 that can be brought into mesh with either a $\frac{3}{4}$ " or a $1\frac{1}{2}$ " Contrate 10 or the 57-tooth Gear 6. (Fig. 4). This provides three movements, one of which operates the hoisting and lowering of the load, another swivels the jib and the third traverses the trolley to and fro along the boom.

The $\frac{3}{4}$ " Contrate is fixed on a Rod that carries the $\frac{3}{4}$ " Sprocket 8 seen in Fig. 2. The 57-tooth Gear 6 and a 1" Pulley 19 are mounted on a 2" Rod, which is passed through a Double Bracket fixed to a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip held by the Bolt 7, and also through an Angle Bracket spaced from the Motor by a Washer. The second movement is obtained when the $\frac{1}{2}$ " Pinion 5 meshes with the $\frac{3}{4}$ " Contrate Wheel. This part is fast on a 5" Rod that also

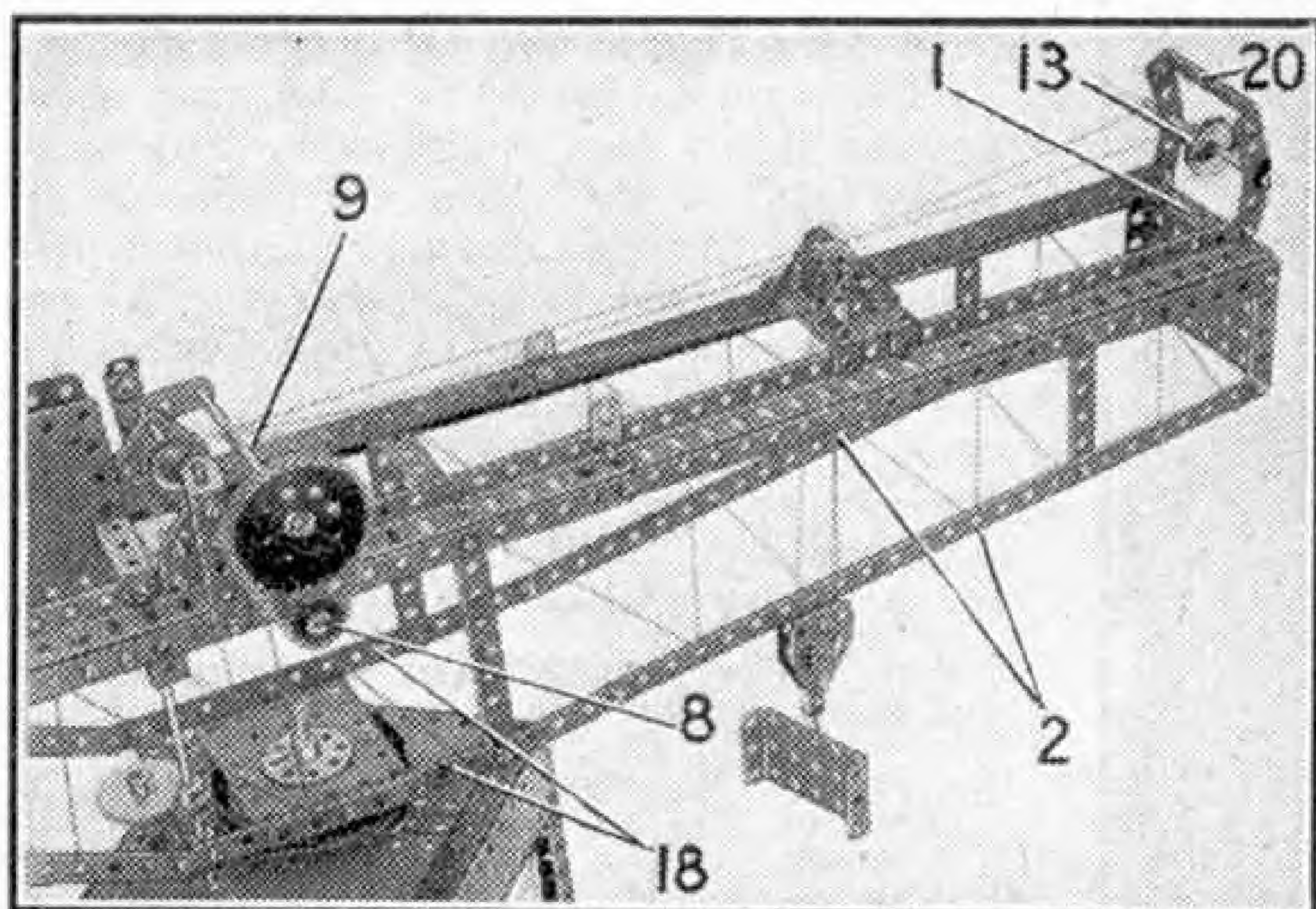


Fig. 2. A close-up view of the boom showing the travelling carriage and the arrangement of the cords.

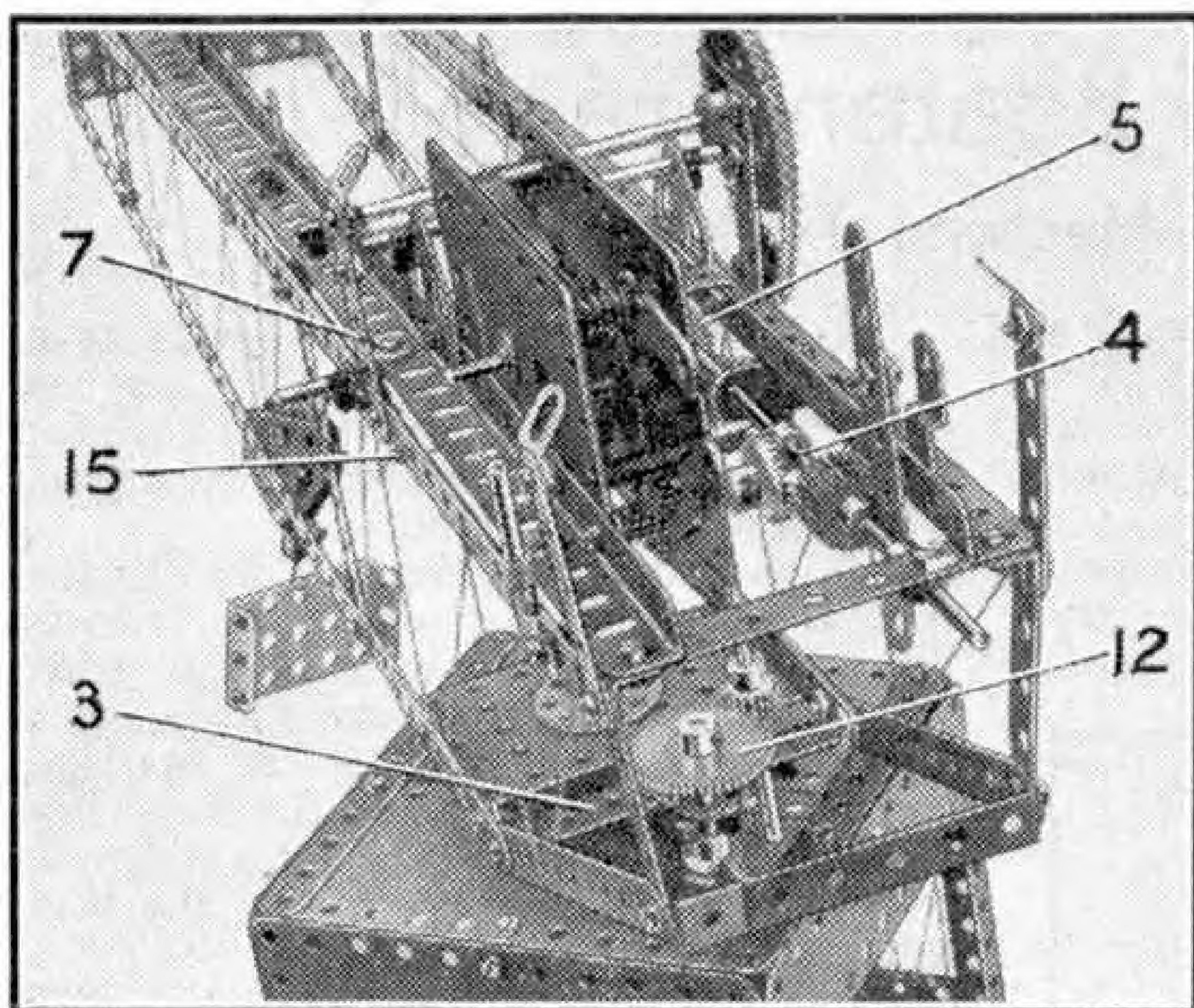


Fig. 3. A rear view of the crane, showing how the Motor is mounted and the layout of the gear selector mechanism.

carries a $\frac{3}{4}$ " Sprocket Wheel 8 connected by Chain to a 2" Sprocket on a 5" Rod 9. Bearings for this Rod are provided by two $1\frac{1}{2}$ " Strips bolted to the $2\frac{1}{2}$ " Strips that form the roof supports.

The jib is swivelled when the $\frac{1}{2}$ " Pinion 5 is brought into mesh with the $1\frac{1}{2}$ " Contrate Wheel 10, which is fixed on a $5\frac{1}{2}$ " Rod passed through a $1" \times 1"$ Angle Bracket 11 and a Double Angle Strip 3. Further reduction is provided by a $\frac{1}{2}$ " Pinion engaging a 50-tooth Gear 12. The 2" Rod holding the 50-tooth Gear is mounted in a Fishplate and a Reversed Angle Bracket, which are then moved sideways till the Pinion and the Gear engage. The Rod also carries on its end a $\frac{1}{2}$ " Pulley.

The gear selector lever is a $3\frac{1}{2}$ " Strip pivotally attached to a Stepped Bent Strip 14. The end of the Strip engages between a Collar and the boss of the $\frac{3}{4}$ " Pinion.

Two $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates bolted to a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate form the top of the tower, and they are strengthened by two $5\frac{1}{2}"$ Strips. Four $5\frac{1}{2}" \times 1\frac{1}{2}"$ Plates are then bolted to the Flanged Plate, and to the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates by Angle Brackets. The ends of the $5\frac{1}{2}" \times 1\frac{1}{2}"$ Plates are extended downward by $5\frac{1}{2}"$ Strips, and connected at 16 by Angle

Brackets or Double Brackets used as angle brackets. The bottom is edged by Flexible Plates of various sizes. A 3" Pulley spaced by two 1" Pulleys 17 is bolted to the top of the tower and has a $3\frac{1}{2}"$ Rod fixed in it. The 3" Pulley bolted underneath the jib is placed on this Rod and is held in place by a Bush Wheel. A double length of Cord is used to form a belt between the fixed 3" Pulley at the top of the tower and the $\frac{1}{2}"$ Pulley on the lower end of Rod 21.

A length of Cord tied at 15 is taken round 1" Pulley 19 and attached by a Cord Anchoring Spring to a $1\frac{1}{2}"$ Rod in a Rod and Strip Connector. This forms a simple brake to prevent the load over-running.

The carriage is made by bolting two Trunnions to two $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The Cord that operates the carriage is tied to one end of it and then taken over the 1" loose Pulley 13. It is then wrapped several times round Rod 9 and finally tied to the rear of the carriage.

The pulley block is assembled from two Flat Trunnions, connected by $\frac{3}{8}"$ Bolts. The 1" loose Pulley is free on the shank of one of the Bolts and the Hook is secured by the other. The Cord for raising the load is tied between the 57-tooth (Cont. on p. 334)

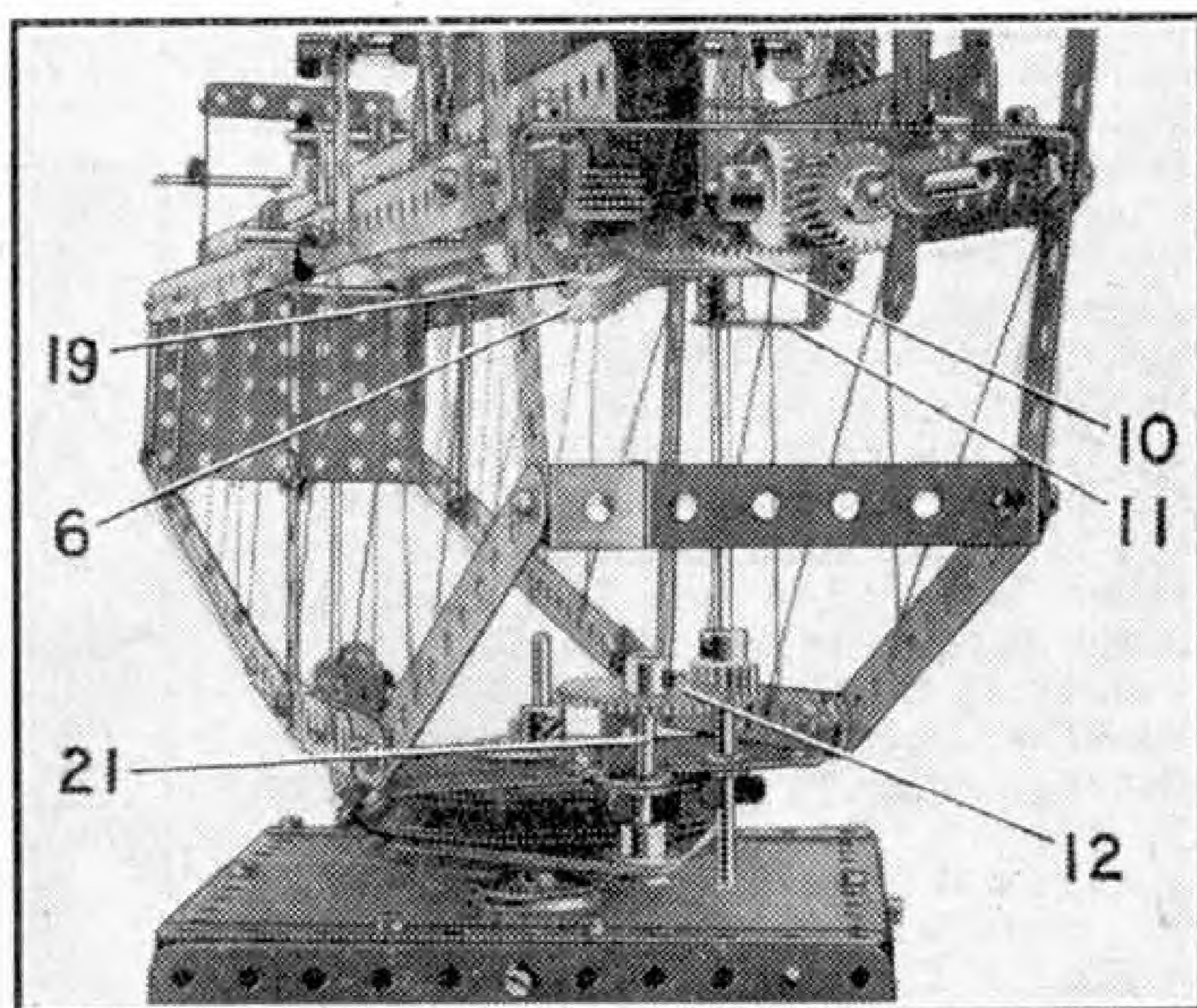


Fig. 4. This view of the hammerhead crane shows the arrangement of the gears that drive the slewing movement.

Off the Beaten Track

A Unique Meccano Typewriter

THE construction in Meccano of such a complicated mechanism as that of a typewriter is an achievement of which any Meccano enthusiast might be proud, and one can understand, therefore, the satisfaction of Mr. H. H. Neville, Twickenham, when he successfully completed the unique typewriting machine illustrated

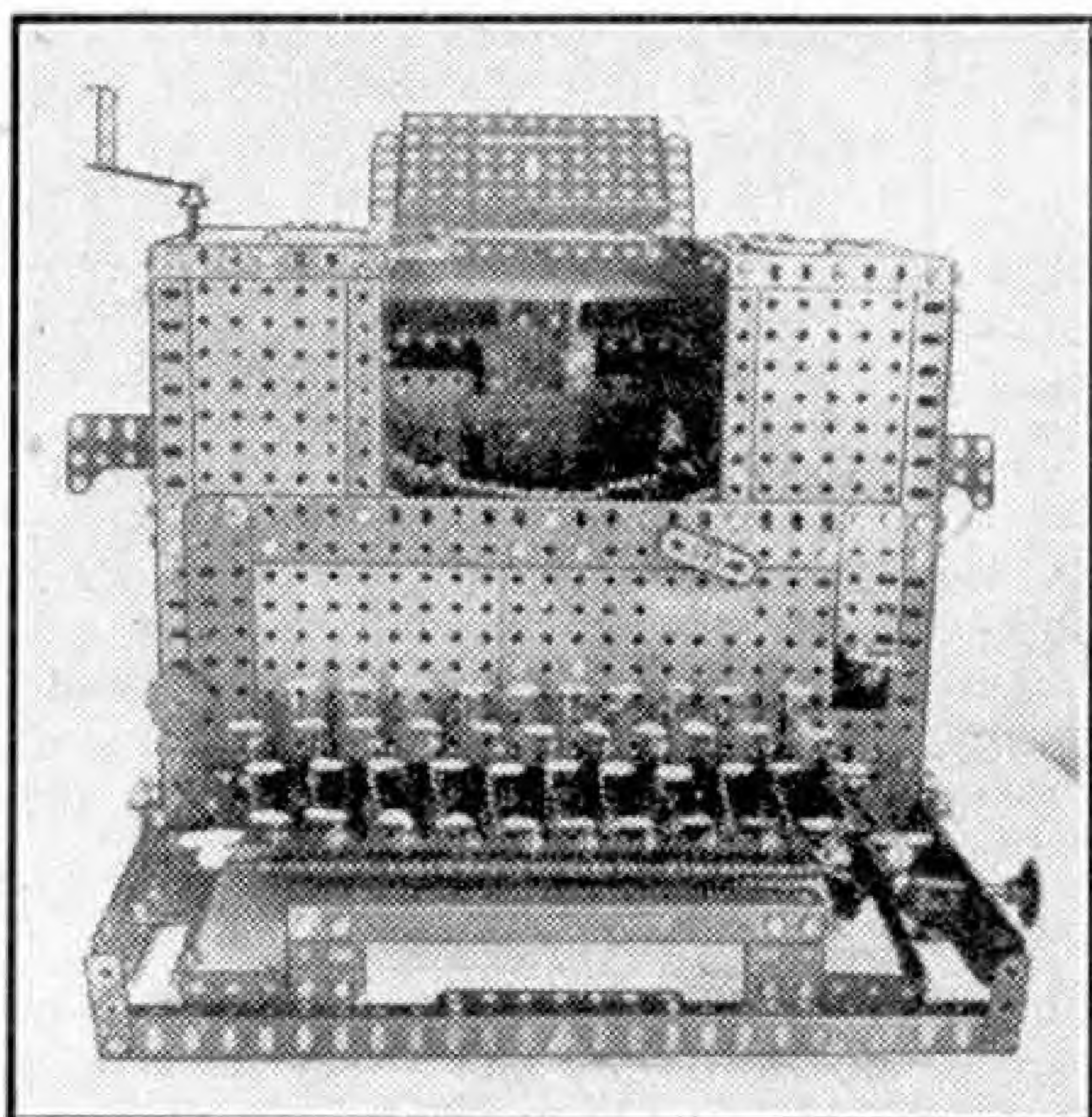


Fig. 1. A working typewriter built mainly from Meccano parts. It was constructed by Hugh H. Neville, Twickenham.

on this page. Although it is not the first time a typewriter has been built in Meccano, few model-builders have succeeded in reproducing so realistically the appearance and functioning of a commercial machine. The model illustrated here is constructed entirely from Meccano parts, with the exceptions of the type, platen and ribbon, all of which the builder was fortunate in obtaining free of charge from a second-hand typewriter dealer. The type had small slots at the back so it was a simple matter to connect it to Meccano Strips. A Bush Wheel was attached to each end of the platen, or roller, by small screws to provide the bearings.

A general view of the machine showing the keyboard and spacing-bar is shown in Fig. 1. The keyboard is similar to the standard layout and has 42 keys giving 84 different characters, two shift keys, shiftlock, backspacer and margin release.

Fig. 2 shows the typewriter upside down with the carriage removed. The carriage spacing feed is actuated by a cord attached to a $2\frac{1}{2}$ " Pulley Wheel geared to the driving shaft of a Clockwork Motor.

The escapement mechanism for the line feed is made up of three parts, two of which are free-wheel mechanisms, while the third is an escapement somewhat similar to that used often in Meccano grandfather clocks. One of the free-wheel devices allows the carriage to be returned, while the other is used to give the back space movement.

Three $3\frac{1}{2}$ " Rack Strips bolted to a $12\frac{1}{2}$ " Strip fastened underneath the carriage, engage a $\frac{1}{2}$ " Pinion mounted on a vertical rod midway along the centre of the carriage bed. This Pinion can be seen in Fig. 2. The vertical rod carrying this Pinion is linked to the escapement mechanism through a 2:1 ratio gearing. The line feed for the carriage is obtained through the movement of the pallets in the escapement mechanism.

The space-bar at the bottom of the keyboard, and a rod running under the keys, are connected to the pallets, so that when a key or the space bar is pressed, the carriage moves forward half a space. On releasing the key, or bar, the other half of the space is traversed by the carriage.

Each time a key is pressed the ribbon

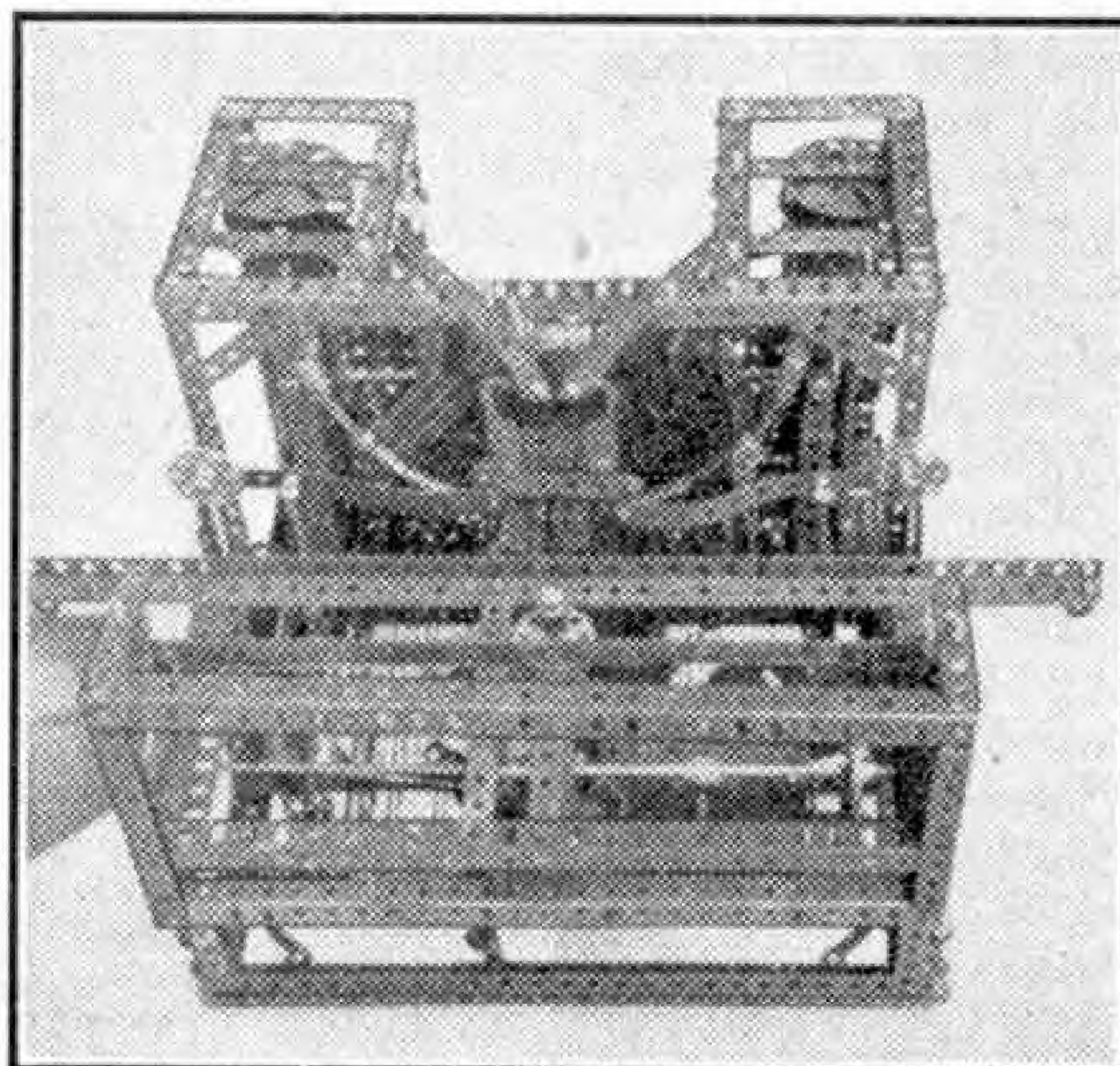


Fig. 2. The typewriter with the carriage removed.

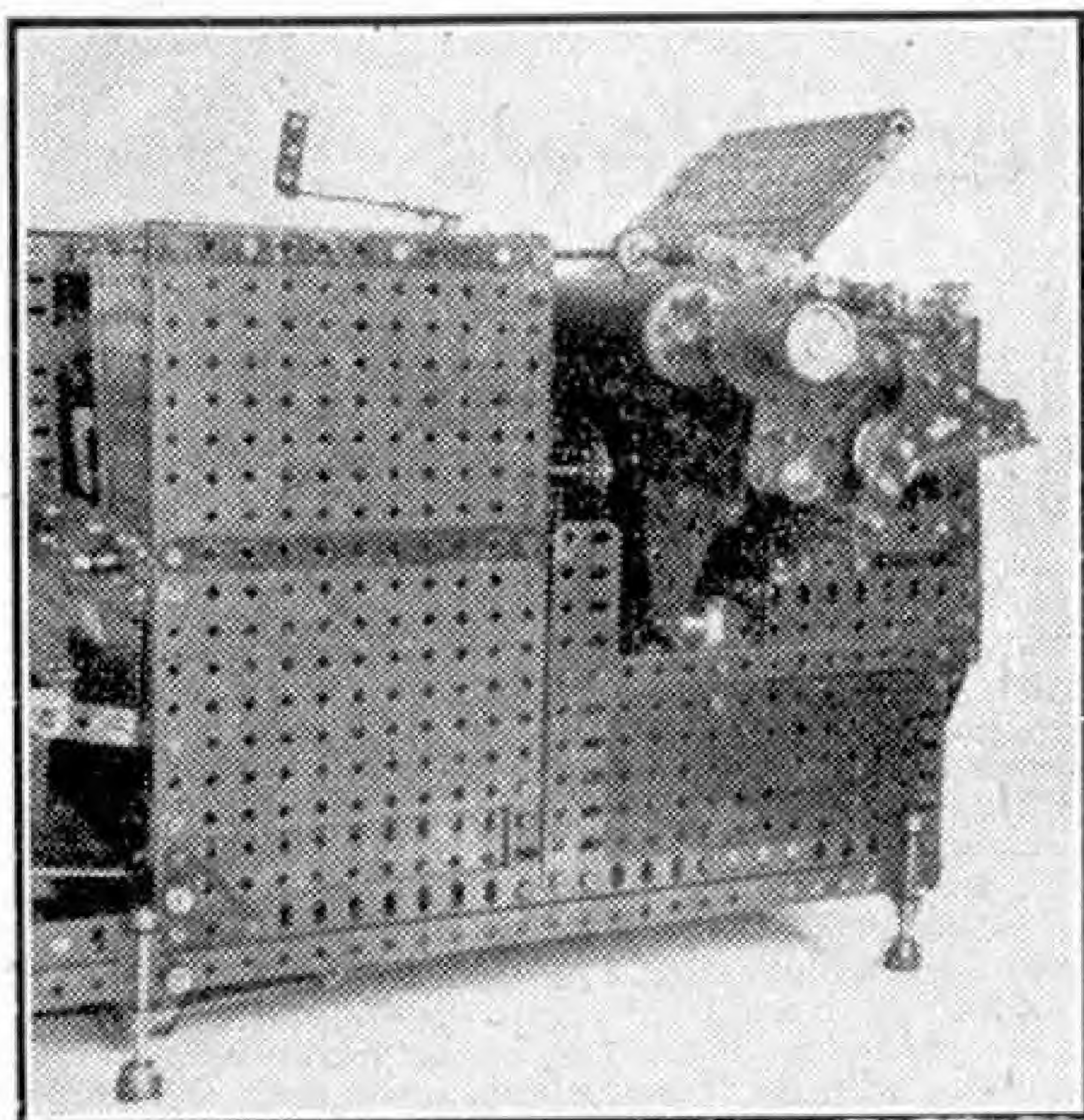


Fig. 3. Side view of the typewriter.

is raised into position by the action of the spacing rod. The ribbon is supported in the ends of two Slotted Strips attached to a framework that is able to slide in the vertical plane. As the spacing rod is pressed it turns the ribbon spool through

a small angle and raises the ribbon framework into the key striking position. When the key is released the framework slides back into position.

The type letters and numbers are attached to the ends of $5\frac{1}{2}$ " Strips, which are all pivoted on an $11\frac{1}{2}$ " Axle Rod bent in the form of a semi-circle as shown in Fig. 2. This Rod is attached by Couplings to a framework built up from Angle Girders and the whole arrangement is able to slide in the vertical plane. The framework is held in position by the action of four Compression Springs, and consequently depression of the shift key pulls the framework down bringing the capitals into position for imprinting. The rail on which the carriage travels consists of two $18\frac{1}{2}$ " Angle Girders, with two $12\frac{1}{2}$ " Strips to form a guide to prevent the carriage swinging out of place.

A carriage release lever moves the $3\frac{1}{2}$ " Rack Strips out of engagement and allows the carriage to slide across freely, for wide spacing purposes.

A long arm, which can be seen at the side of the model, actuates a ratchet mechanism that provides a feed to the roller for spacing the lines of type.

Model-Building Competition

"Birds and Beasts"

The novel "*Birds and Beasts*" competition announced in last month's "*M.M.*" is still open for entries in both the Home and the Overseas Section, and we hope that every reader will send in an entry for this unusual and interesting contest. The competition is for models of birds and beasts of any kind, and under this heading we include also fish, reptiles and insects, in fact every living creature except human beings.

From time to time we receive from readers details of remarkably life-like birds and animals constructed entirely from Meccano parts, and it is obvious from these that there is wide scope for ingenuity and model-building skill in reproducing living creatures in Meccano. Models may be constructed in the flat, or in half or full section, and may if desired be fitted with suitable mechanisms for reproducing the movements of the creatures they represent.

There is no restriction on the number of parts that may be used, but life-like models can be constructed using only a few simple parts, and the contest should

therefore appeal particularly to owners of only small Outfits. The only condition is that models must be entirely the unaided work of competitors.

Competitors should send in either photographs or sketches of their models, together with brief notes covering any points of interest not immediately apparent from the illustrations. The competitor's age, name and address must be written clearly on the back of each illustration submitted, and entries must be addressed: "*Birds and Beasts Contest, Meccano Ltd., Binns Road, Liverpool 13.*" The closing date in the Home Section is 31st July, but Overseas entries will be accepted up to 31st October.

The following prizes will be awarded in each Section for the best models submitted: First, Cheque for £3/3/-, Second, Cheque for £2/2/-, Third, Cheque for £1/1/-. There will be also five prizes each consisting of a P.O. for 10/6, and five awards each of 5/-.

It should be noted that photographs or drawings of prize-winning models become the property of Meccano Ltd.



Club and Branch News



WITH THE SECRETARY

THE SUN DOES NOT ALWAYS SHINE

Rainy days will come in the summertime, and there may be occasions when the weather is unsuitable for some particular outdoor activity that has been planned. It is not quite fair just to tell members that the ramble or game of cricket or whatever was planned has been abandoned. That is the best way of quenching enthusiasm! Something must be arranged for them, and generally the best thing is to settle in the Club room for a while. This is easy if Headquarters are made the meeting place when any excursion or game is afoot.

What is to be done in the Club room on such occasions as these? In some cases members devote themselves to tidying up and to special preparations they have in mind for better storage of materials, or for improved facilities for Model-building and Games. In others they play indoor games of some kind, and if this is the choice some kind of competition should be organised.

Other forms of contest can easily be arranged. In one impromptu entertainment of this kind the Leader of the Club concerned used an epidiascope to project on a screen drawings and pictures of special parts of simple models, and members were asked to describe these sections as well as they could after examining each for half a minute. Where no projection device is available the actual drawings or cuttings, pasted on strips of card, can be passed round, members retaining each for the allotted period before giving it to his neighbour.

A few minutes spent in preparing simple contests of this kind will often help to fill in a very awkward gap in the outdoor Sessions.

MERIT MEDALLIONS

We are now past the close of the first of the two outdoor Sessions and I wish to remind Leaders of the Merit Medallions. Two of these are available in each term for each affiliated Meccano Club, and in every one of these organisations there must be members who have accomplished something deserving the award. Leaders should send in their nominations immediately, indicating just what kind of activity the member concerned has followed.

CLUB NOTES

MILE END (PORTSMOUTH) M.C.—The Club is now settling down to good work, with excellent model-building, including competitions. A successful Open Night has been held, with a Film Show, and preparations for an Exhibition are in progress. A Radio Section has been formed and a set for Club use is being made. *Secretary:* Mr. A. J. Nicholson, 213, Sultan Road, Buckland, Portsmouth.

GREAVES METHODIST CHURCH (LANCASTER) M.C.—The chief recent event has been the Club's first Exhibition. This was very successful. Large models

constructed for the display were highly praised by visitors. Other meetings have included a Debate, a Lecture at which members gave short Talks, and an enjoyable Social. Club roll: 9. *Secretary:* T. Starr, "Derwent," Scotforth Road, Lancaster.

BELGRAVE UNION (LEICESTER) M.C.—This newly affiliated Club was opened by Mr. F. S. North, President. All present enjoyed a Film Show, with refreshments. Model-building was begun at further meetings. Locomotive Spotting is one of the Club's activities. A General Knowledge Quiz has been held. Arrangements for a display of models built by members are being made. Club roll: 32. *Secretary:* C. G. Smith, 20, Aneford Road, Leicester.

NEWBURGH M.C.—At one meeting a Road Transport System, including a Docks Section, was operated. Interesting models have been built, and two of the older members demonstrated an interesting pulley system. Hornby Train Nights have been introduced into the programme. Club roll: 14. *Secretary:* K. Lang,



Members of the Thornton Grammar School (Bradford) M.C., with Mr. J. W. Smith, Leader, and A. J. Hird, Secretary, who is second from the left in the second row. This Club was affiliated in July 1944, and has been distinguished for excellent Model-building. Special groups have been formed for Stamp Collecting and Train Spotting, and the programme also includes Talks and Film Displays.

Gwendor, Course Lane, Newburgh, Nr. Wigan.

BRANCH NEWS

HIGHGATE JUNIOR SCHOOL—Progress has been made with the Branch Layout. Scenery is to be built for it and a timetable has been compiled and put into operation. A special display is being prepared for the School Art Exhibition. *Secretary:* P. M. Cohen, 50, Middleway, Hampstead Garden Suburb, London N.W.11.

SEFTON PARK (LIVERPOOL)—Meetings have begun. At present each member in turn is building up a layout at home and other members join in operations and discussions. More members are required and the secretary will be glad to hear from enthusiasts in the neighbourhood. *Secretary:* D. Lazarus, 78, Langdale Road, Liverpool 15.

A Hornby Layout in Guernsey

WE illustrate here part of an interesting Hornby Clockwork layout that is owned by "M.M." reader A. McDade, of Guernsey. In addition to the items from the current range of Hornby trains, it includes many articles of pre-war manu-

by means of a home-made bridge. The smaller part of this depot is situated practically in the centre of the upper illustration, the rail approach being formed of 1-ft. radius curves. The second goods depot appears on the right of the lower illustration, with a goods train just arriving. Each depot is well served by road motor vehicles chosen from the Meccano Supertoys range. The vehicles represented are ideal for this type of work.

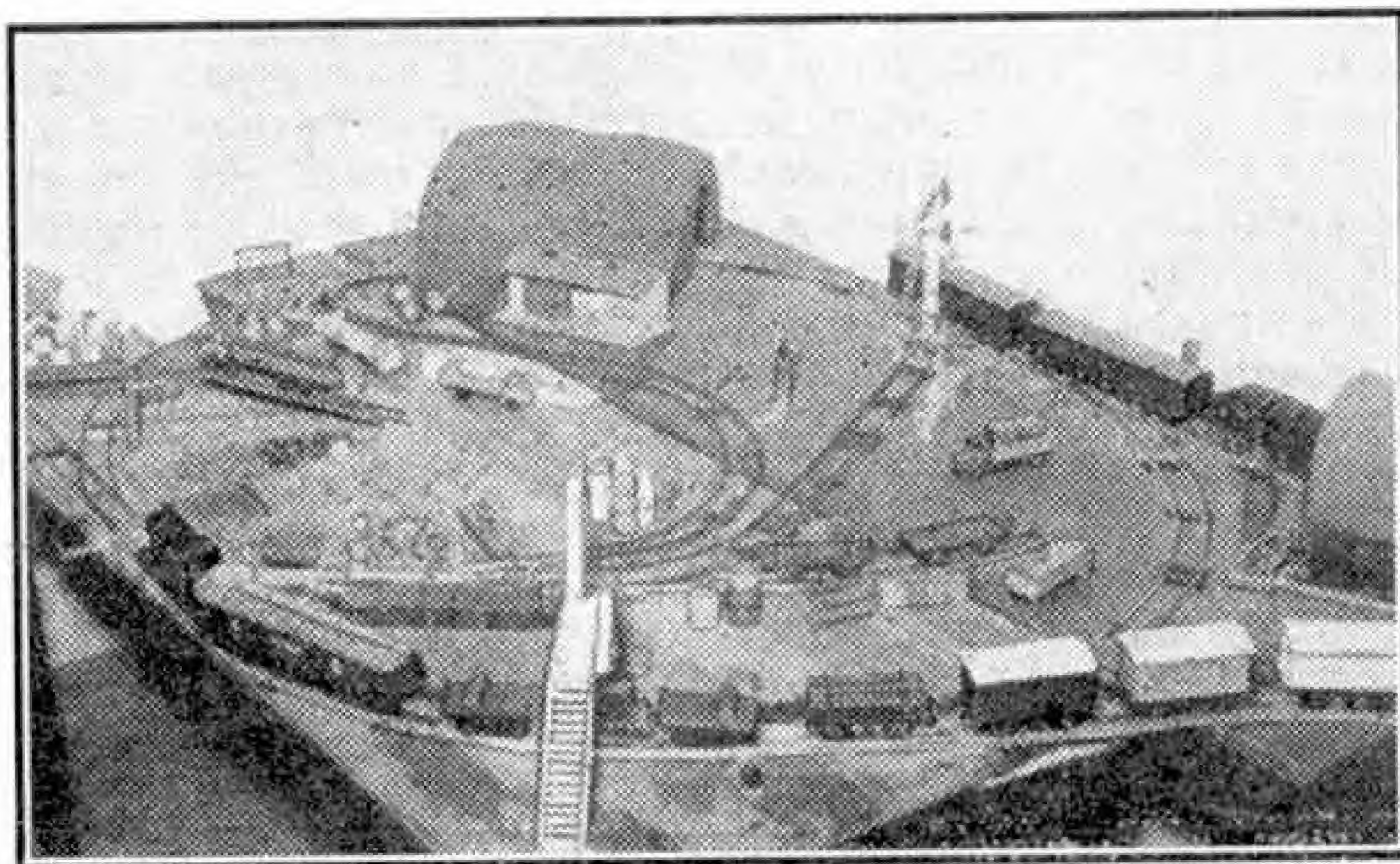
Four of the engines in use are of Hornby manufacture, three of these being 0-4-0s of current type and the other a large 4-4-2 Tank Locomotive dating back to pre-war days. These four engines handle practically the whole of the regular traffic, as the fifth engine, which is of American type, is only used for special runs.

Time-table operation is regularly practised on this system, and it takes one hour exactly to work through the whole table. Four operators are needed, one for each engine. As the members of the "staff" are frequently different a system of special signs has been evolved. These display various numbers that are used to identify particular tracks. In the working arrangements a master time-table is made out, and there is a job card for each engine driver.

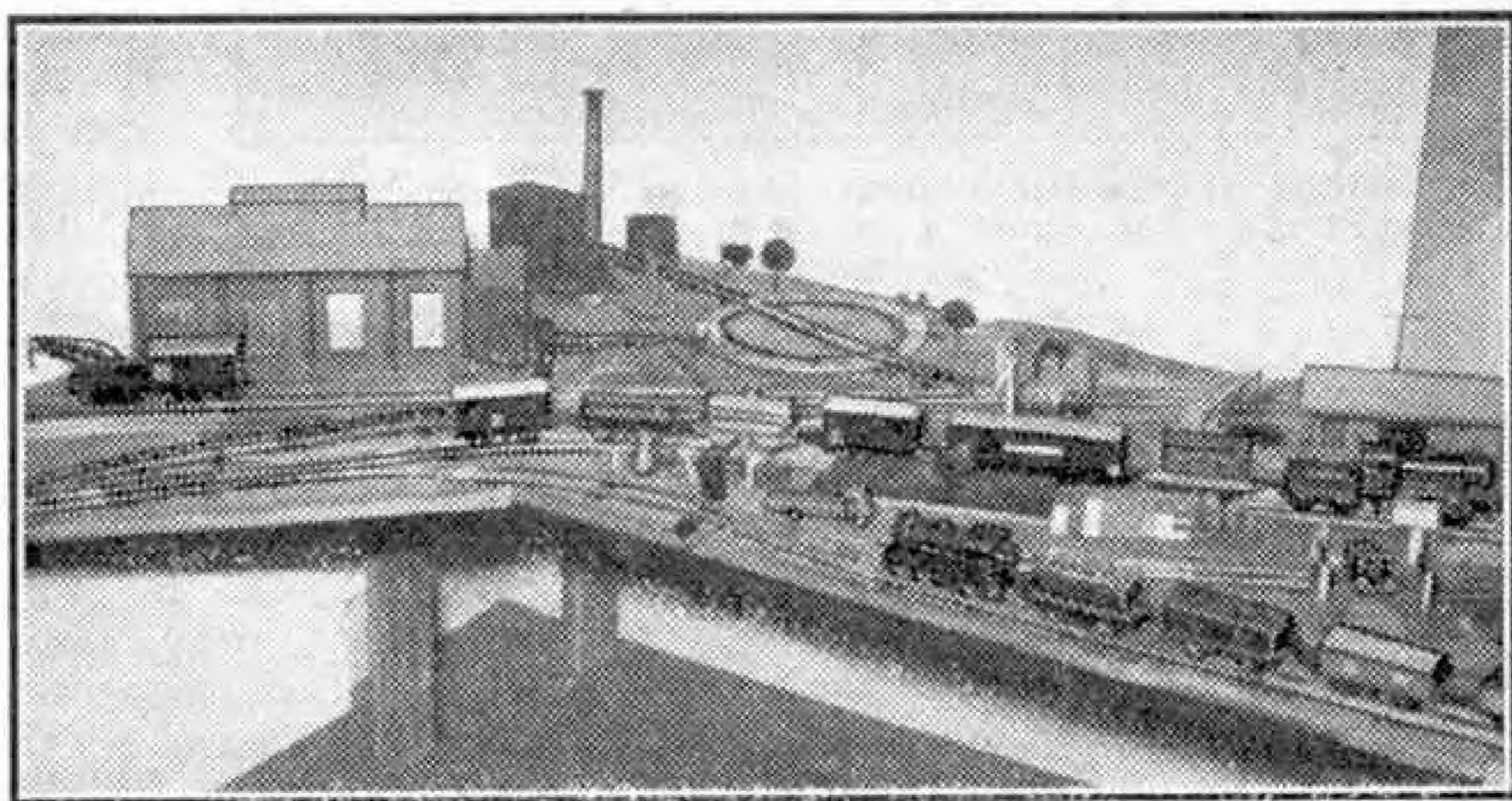
factory. It is situated in an attic and is laid partly on tables and partly on planking at a height of about 3 ft. from the floor. The owner is fortunate in having the comparatively large space of 23 ft. by 16 ft. at his disposal. One result of this is that the total "mileage" amounts to over 100 ft. and the railway extends completely round the room.

There is one passenger station, served by both main and subsidiary tracks. Both tracks are continuous, and the main line fittingly includes a long stretch of straight track. This is a big advantage where clockwork engines are employed, but unfortunately lack of space does not often permit of this nowadays.

The system boasts two goods depots, one of which is arranged in two parts separated by the main line. Connection between the two is arranged



Part of the layout of "M.M." reader A. McDade, Guernsey. The main line passes across the foreground, part of the goods depot appearing beyond it.



Another section of the track showing a goods depot on the right and an engine shed turn-table, and other features in the centre.

Hornby-Dublo Signals

AS promised recently in these pages, we give a few notes on Hornby-Dublo signals and their use on layouts. Scarcely any lineside feature contributes so much to the railwaylike effect on a miniature layout as a system of signals. Hornby-Dublo Signals are of the familiar semaphore pattern so characteristic of the British railway scene, and they are of the upper-quadrant type that has been increasingly installed in recent years in place of the older lower-quadrant variety.

There are at present in the Hornby-Dublo system three patterns of signals. There is the home or "stop" signal distinguished by its red-faced semaphore, or arm, having a white stripe near the outer end of it. The second type is the distant signal, having a yellow face to the semaphore and a vee-shaped notch cut in the outer end of it. Instead of a white stripe, a

home type should be provided at the outer ends of the platforms in order to give trains permission to start. In this instance, such signals are referred to as starting signals. When they are used to admit trains to the station they are correctly known as home signals.

The home or stop type of signal should also be used to protect any points along the main line. Trailing points should have a stop signal both on the main line and on the branch or loop line leading to the points.

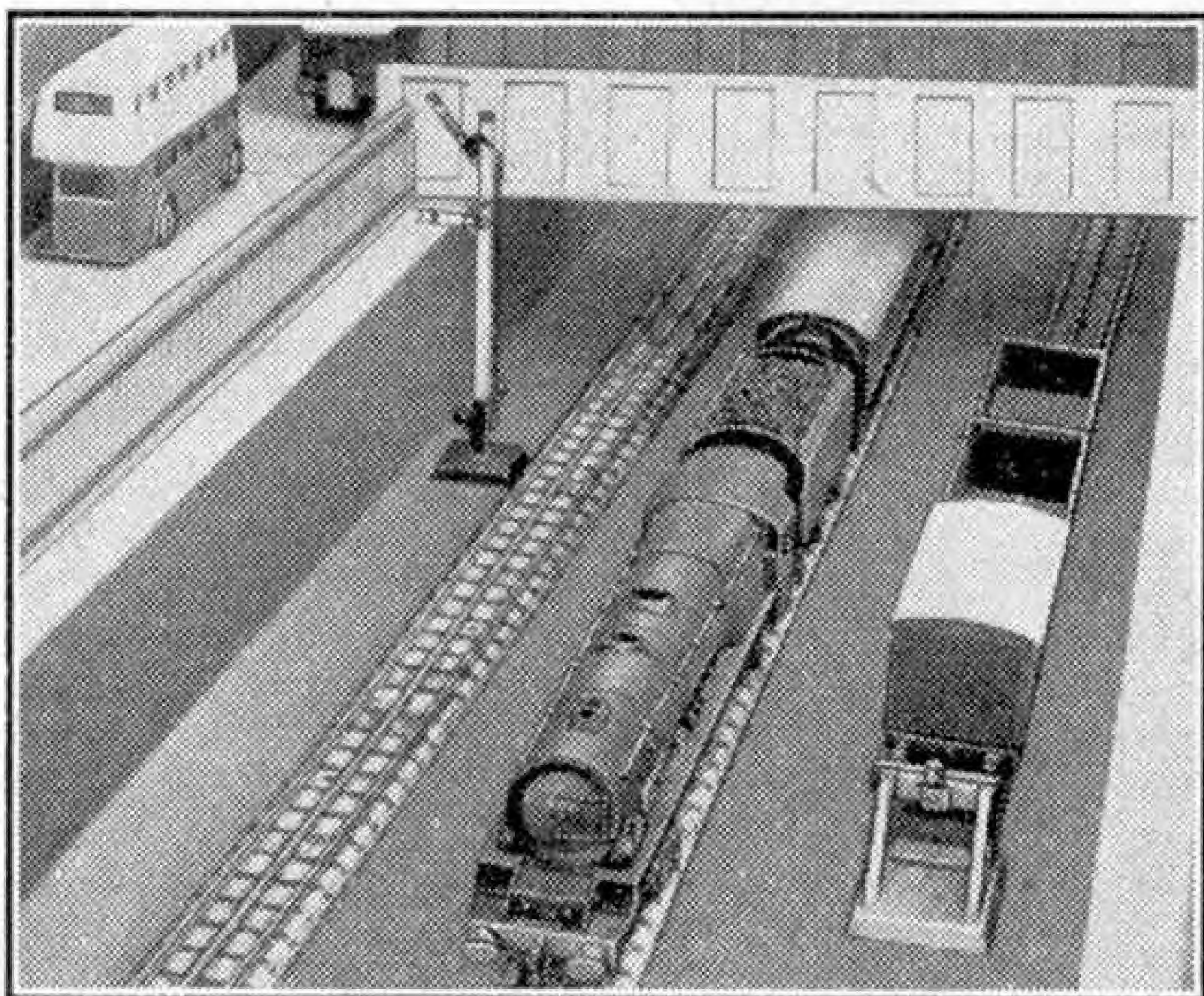
Facing points leading to sidings or loop lines need protection, and here we have to provide for the choice of routes that is made available by the points. Normally, junction signals, again with square-ended semaphores, are used for this purpose; but as this type has not yet reappeared in the Hornby-Dublo system we have to use two separate single-arm signals side by side.

The distant signal is a warning signal that gives advance information to the driver as to the state of the road ahead, so that it may be passed when its semaphore is in the horizontal "caution" position. It is placed well before the home signal, so that in the event of its being at "caution" there is time to bring the train to a stop should the home signal still be in the "danger" position by the time the train reaches it.

On a Hornby-Dublo system in miniature the lack of length on a layout may prevent the correct employment of the distant signal. This is where the Double-Arm Signal is useful. It always consists of a home arm above a distant arm on the same post, the distant arm in this case applying to the next home signal ahead. Where sections are short, as they

nearly always are in miniature, the Double-Arm Signal can be used very effectively. The home arm may show "clear" and the distant "caution," as they do in the picture on this page; or both may show "line clear." But the distant must not show "clear" with the home arm on the same post at "danger."

Various combined arrangements of these Hornby-Dublo Signals will suggest themselves to readers.



An unusual Hornby-Dublo scene showing the railway below "street level." The signal is of the double-arm type referred to on this page.

black vee-shaped marking appears on this arm.

The third type is a combination of the other two, for both home and distant arms are mounted on the same post, as shown in the picture on this page. This is an effective signal in miniature, and it is a particularly useful one. Its exact purpose we will refer to later.

As far as possible on a Hornby-Dublo railway, signals of the square-ended or

Well-Arranged Hornby-Dublo Layout

Independent Main Line Control

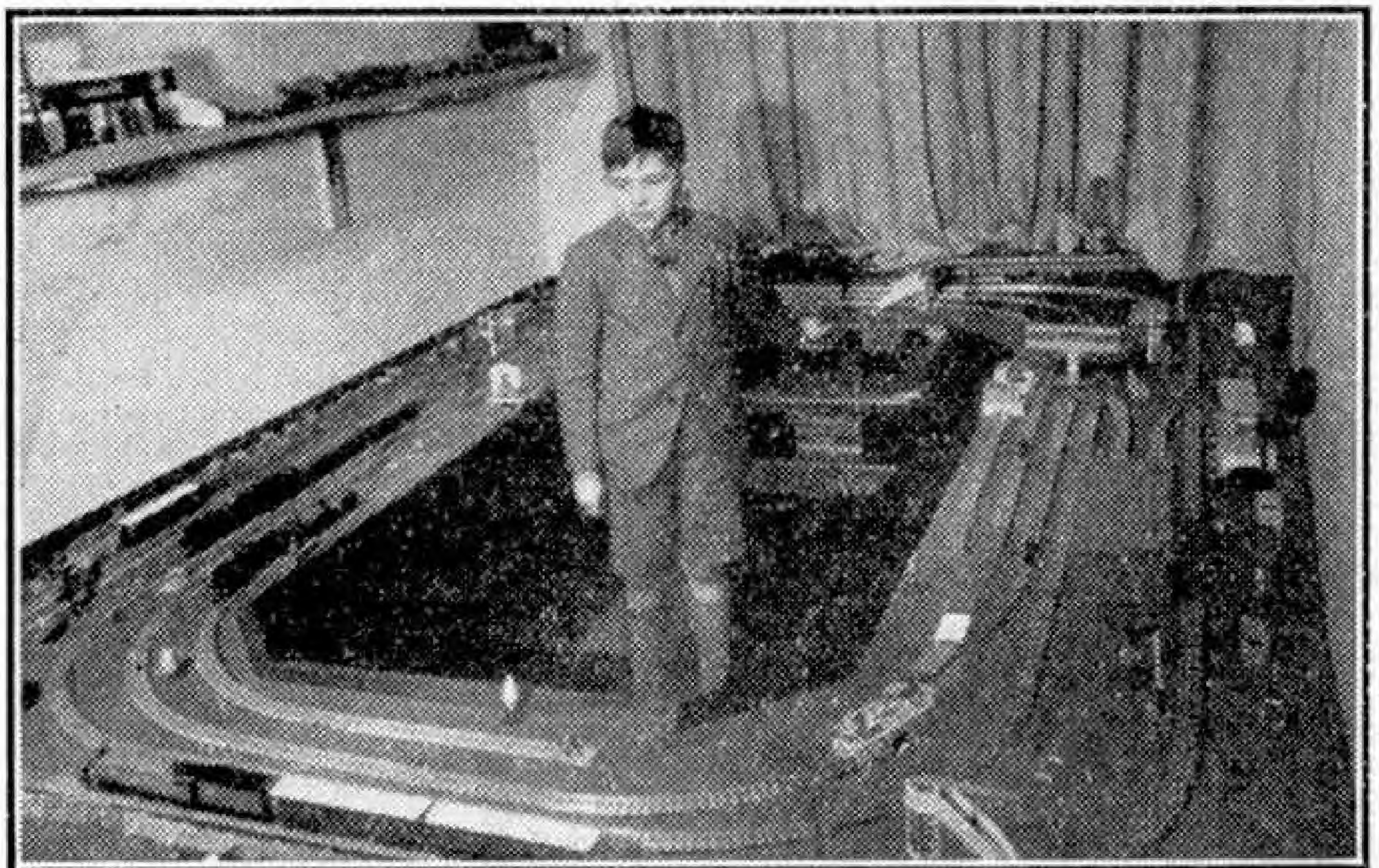
THE picture on this page shows "M.M." reader Michael Warren of Woodhall Spa busy operating his extensive Hornby-Dublo railway. This railway is arranged permanently on a raised baseboard, and as a result of careful planning and construction the whole system has a neat, well-cared-for appearance.

The layout has been built up by degrees until it now consists broadly of three main continuous tracks with various sidings and loop lines. Each of the three main tracks has its own Transformer and Controller, as frequently recommended in these pages and in correspondence with Hornby-Dublo enthusiasts, because this affords complete independent control of each track. Thus there can be three trains in motion at once on this layout, each train on its own main circuit. In addition, the provision of Isolating Rails in loops or sidings allows a fourth train to be held for the time being in any one of the several sections so formed, current being cut off from the section concerned by means of the corresponding isolating switch.

Two passenger trains and two goods trains can be made up from the stock available. Both L.M.S. and L.N.E.R. type 4-6-2 engines, "*Duchess of Atholl*" and "*Sir Nigel Gresley*" respectively, are available for express passenger work, and there are two Hornby-Dublo standard 0-6-2 Tank engines for goods and local traffic. Train operations are very varied, and the make-up of the different trains is altered to suit traffic requirements. At the time the photograph was taken, for instance, the L.N.E.R. train nearest the camera consisted of the standard two-coach formation, an additional vehicle of the same kind being left for the time being in a siding.

Naturally, freight trains provide more opportunity for variation in make-up and working arrangements. The running programme evidently includes the operation of an express goods train of vans only when required, for a train of this kind is visible beyond the footbridge in the right-hand corner of the photograph.

Hornby-Dublo Uncoupling Rails are located in suitable positions on the line, and these are a great help in the shunting and marshalling operations that can be such an attractive yet necessary part of miniature railway working. The use of the Uncoupling Rails in conjunction with the isolating sections makes it possible



"M.M." reader Michael Warren busy with his Hornby-Dublo layout. The neat and tidy arrangement of the track as a whole will be noted.

for vehicles to be attached to or detached from passenger trains at different points on their journey. Similarly, in freight train working individual wagons or groups of wagons can be picked up or set down.

Lineside features add to the attractiveness of the layout as a whole, good use being made of miniature fencing to separate the railway from the grazing land alongside it. This territory is occupied by numerous miniature cattle which do not seem to be at all disturbed by the frequent passing of the trains.

The buildings include an engine shed, two signal cabins, and goods and passenger stations.

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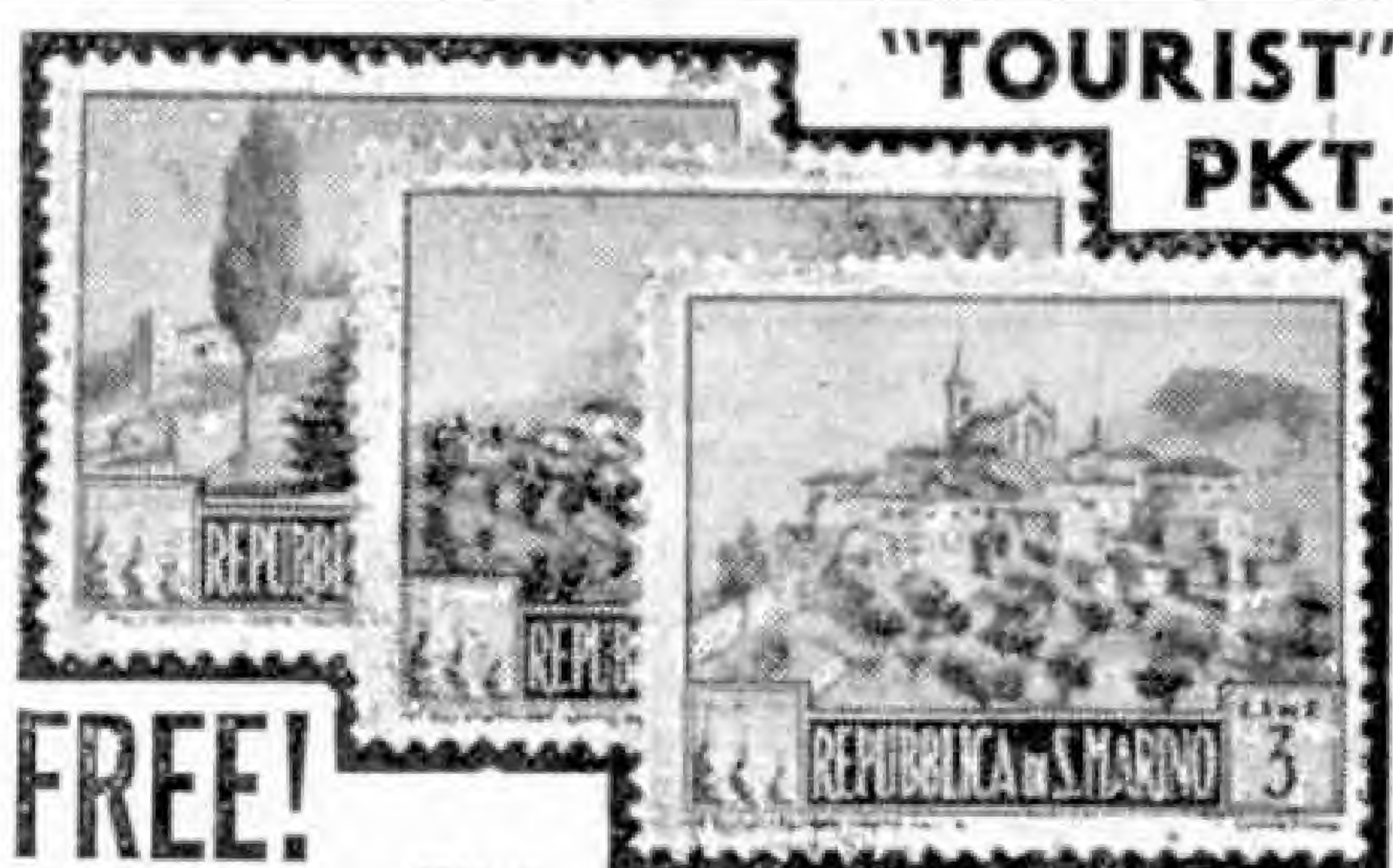
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Stamp Collecting

Printing and Perforating

By F. Riley, B.Sc.

A STAMP is more than a pretty piece of paper, as every interested collector soon begins to see. For instance, let us look at the Kenya, Uganda, and Tanganyika stamp illustrated on this page. Any reader possessing this stamp who runs a finger nail lightly across its face will find that the lines and



letters on it are raised above the surface of the paper on which it is printed. On turning it over he will notice too that the back of the lettering of the names of the three countries where the stamp is current is sunk.

The explanation of this is to be found in the man-

ner in which it was printed. It is an example of recess printing, or line engraving, printed from a metal plate in which the lines were cut out by a graving tool to form hollows. In printing, the ink is distributed over the plate so as to fill the hollows, and any ink on the surface is wiped off. The paper is then pressed on to the plate so that it is forced into the hollows to some extent, where it picks up the ink. This accounts for the ridges and hollows of the stamp, but these are not always so easily detected as they were on the actual stamp from which the illustration was reproduced.

A very large proportion of the world's stamps are produced by recess printing, but there are other interesting methods. These I hope to deal with in a further article, but now let us turn to another feature of the Kenya stamp, the little holes, or perforations as they are called. The purpose of these is to allow the stamps to be separated easily. After printing the sheets are perforated by means of pins set in a row, giving line perforation, or mounted in such a manner that they perforate the two sides and the bottom of each stamp at once. The second of these arrangements gives what is called comb perforation. There are also other arrangements of a more complicated kind introduced to speed up the punching of the holes and to make it more accurate.

Whether line or comb, perforations differ considerably in the sizes of the holes and the distance between them, different stamp printers making use of perforating machines of different dimensions. The collector classifies them by the number of holes in a length of 2 cm., which is about four-fifths of an inch. If this distance were measured along the top of our Kenya stamp and the number of holes in it were counted

they would be found to be 13. This applies also to the sides and the bottom, so the stamp collector says that this stamp has perf. 13.

Now look at the Seychelles

stamp illustrated here. The top of this stamp is of perf. 14½, which means that the 2 cm. distance finishes half way across the 15th opening from its beginning at the tooth of a perforation. The bottom of the Seychelles stamp is of the same perforation as the top, but the sides are of perf. 13½. Differences of this kind are not at all unusual. Many of our British Colonial stamps have perf. 11½×11, or 11 by 11½, and the Ceylon 10c. illustrated on this page is an example of this. When two perforation values are given for any stamp the first always refers to the top and bottom, the second to the sides.

Perfs. are often useful in distinguishing between different issues where designs are unaltered. The Bahawalpur 9p. U.P.U. first appeared with perf. 12½, but later supplies with perforation 17½×18 came along. The difference is clearly visible in the reproduction of these two stamps side by side that appears on this page. The explanation given is that

the first supplies were perforated in Great Britain by the printers, who were unable to perforate the whole of the printing. The rest was perforated in Rangoon.

Another interesting example of a perforation change comes from Fiji. The ½d. stamp of the 1938 issue of this country was of perf. 13½, but in 1942 another ½d. stamp was issued in which the design and colour were the same, but the perforation had been changed to 14. Measuring the perforation of a Fiji ½d. stamp of this series therefore will show whether it is from the 1938 issue or from that 1942. Apart from the interest of such perforation changes, they may affect values. In this instance the unused stamp with perf. 14 stamp

is marked at a considerably higher value in the catalogues.

Special gauges can be bought from stamp dealers that allow the perforation of a stamp to be found immediately. On these gauges are rows of black dots, each corresponding to a particular perforation. All that is necessary is to find the row in which black dots fit exactly into the holes on the edge of the stamp. The perforation can then be read off on the scale. Every stamp collector should have one of these gauges and should make good use of it.





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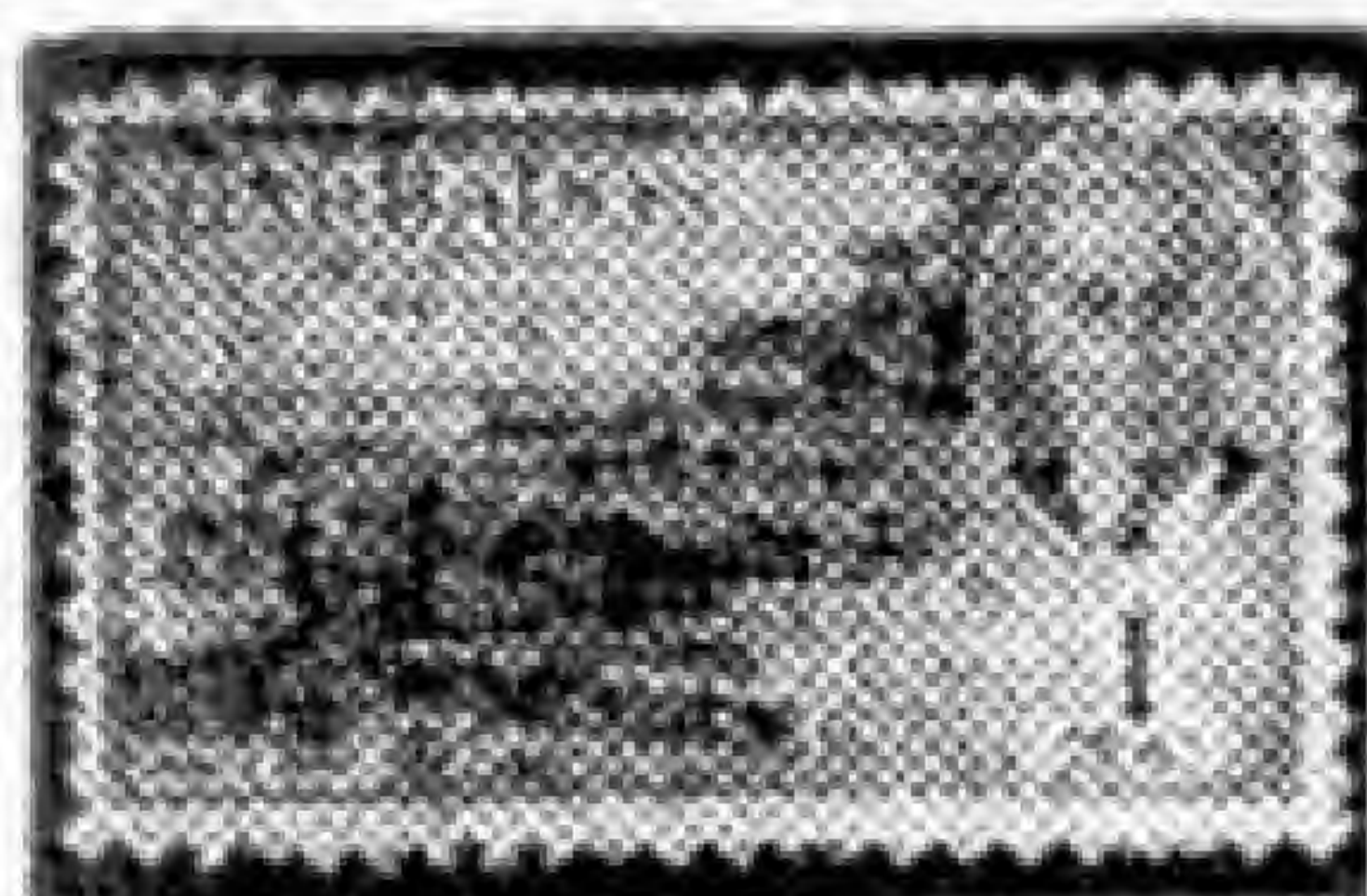
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Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

THIS month pride of place must be given to the new set for Barbados, for this colony is perhaps the most popular of all with British collectors; at any rate the set which has just gone off sale has been collected to a greater extent than any other set of the present reign. A lot of this popularity was due to the perforation varieties that cropped up from time to time.

Some readers will remember that in 1943 they were advised to buy the 1d. red stamp of this set, perforation $13\frac{1}{2} \times 13$, which could easily be picked up for a shilling a copy. As a matter of fact the writer of these notes bought one or two, mint—used is common—at 9d. each after the tip had been given. Those same stamps readily sell now for 70/- each. Of course that is not a record for a perforation variety of KG VI issues. About the same time the 10/- Granada perf. 12 was selling at about 30/-, and soon it will sell at thirty pounds; it already makes £25. Can one wonder that KG VI stamps are so much the rage, with such plums amongst them?

Recently a collector asked why a dealer wanted three times face value for a set of Maldivé Islands stamps, those small ones with the funny tower for a design. Surely, he said, they must be current. Now this is an interesting point which is worth a few words of explanation. Many collectors, seeing a set of stamps in a dealer's window and knowing that they have not been replaced by new stamps, assume that all are current. Well, they may be current, but it by no means follows that they are obtainable at face from post offices, and this is apparently the position of Maldivé Island stamps. Three times face is far too dear, and the collector was quite right to refuse to pay such a high price. At the same time, it has not been possible to get these stamps from the post office at Male, the capital, for a long time. It is probable that not many values, if any, are actually on sale there, but there is official news that a new set is in preparation, and as these islands are no longer tied up with Ceylon, perhaps in future dealers will be able to import. Then there will be no collectors grumbling about the price they have to pay, for competition will prevent high prices.

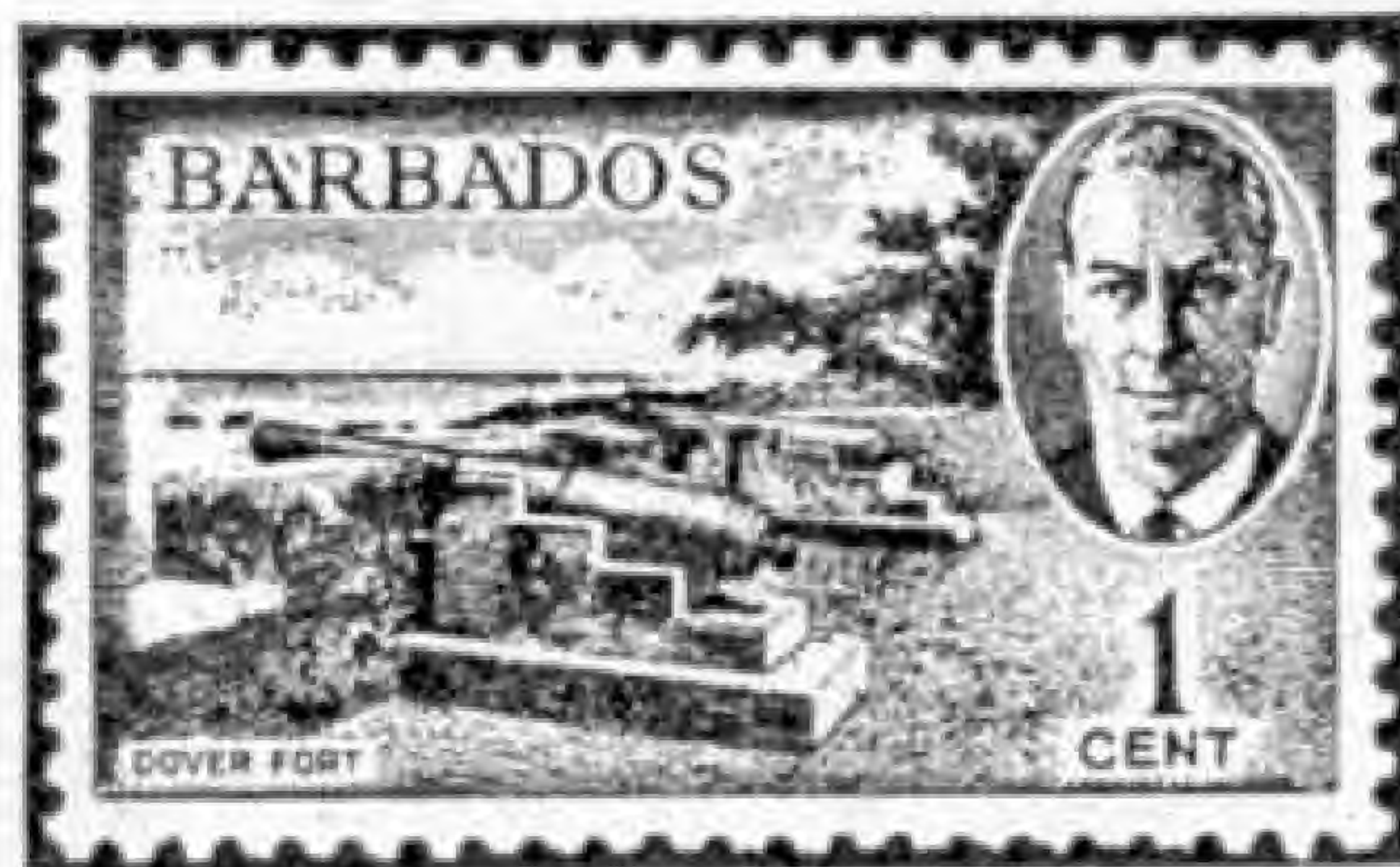
Another collector of colonial stamps asks what "chalky" stamps are and how they can be detected.

He says that he is very interested in knowing, for he has been told that during the war colonial stamps were printed

on a new kind of paper and now that "chalky" paper is again being used for new printings, he thinks that it might be worth his while to get these war printings while they are obtainable at a reasonable price.

This is a subject which has interested a number of collectors, so here goes for a few words of explanation.

Philatelists have their own terms, and these are not always very exact. What they call "chalky" is paper that has a coating, mostly composed



of chalk, and if this is rubbed with a piece of pure silver, a mark like a pencil mark is left. A silver coin of Queen Victoria will do for this test, but a modern "silver" coin is useless. One needs to be rather expert, however, for more than one kind of war substitute paper was used, and some of it had chalk mixed in the pulp, while chalk was sometimes found even in the ink used for printing the design. With this kind of paper, while it is not "chalky", one still gets the mark from rubbing with silver, but it is relatively faint. To sum up, the mark must be quite a strong one to indicate paper really coated with chalk.

We had promised to say no more about the ubiquitous "U.P.U." issues, but it is hard to avoid mention of them altogether, for countries still continue to bring out new sets. Collectors apparently are getting a bit tired of them, for all kinds of varieties are cropping up, and as some of them are bringing fancy prices, those who thought completion could be reached easily and cheaply are now finding things a bit beyond them, with the inevitable loss of interest. What was said before about their ultimate value can be repeated now, and those who do manage to collect a complete set will have a valuable property indeed. As far as the colonial issues are concerned, these are turning out better than many expected; a set which cost £7 now brings £11, and one day £20 will be about the price. Incidentally we are illustrating the U.P.U. stamp that many think to be the most beautiful of all the hundreds which have been issued. It is from the Belgian Congo. The writer of these notes prefers Australia's effort.

No doubt many readers visited the International Stamp Exhibition, which was held in London last May, and now we are getting the reactions from overseas visitors who attended in fair numbers. All were apparently impressed by the smooth efficiency displayed in the running of the grand display, but everything was on such a large scale, that, as one put it, it was difficult to see wood for trees. Another expressed disappointment that KG VI stamps had been given such a poor show. There was something in that criticism, for while collectors of stamps of the present reign probably number as many as all the rest put together, it was only here and there that one of these stamps was to be seen, and it was easy to see where the sympathies of the organisers lay. Still all in all a good job was done, and some of us will remember for a long time the treasures on show. We may never own any of them, but we can still get pleasure out of seeing them at these great exhibitions.

A tip for the month. Buy your set of "U.P.U." for the colonies as soon as you can, if you want one, for it is going to be a very good set.



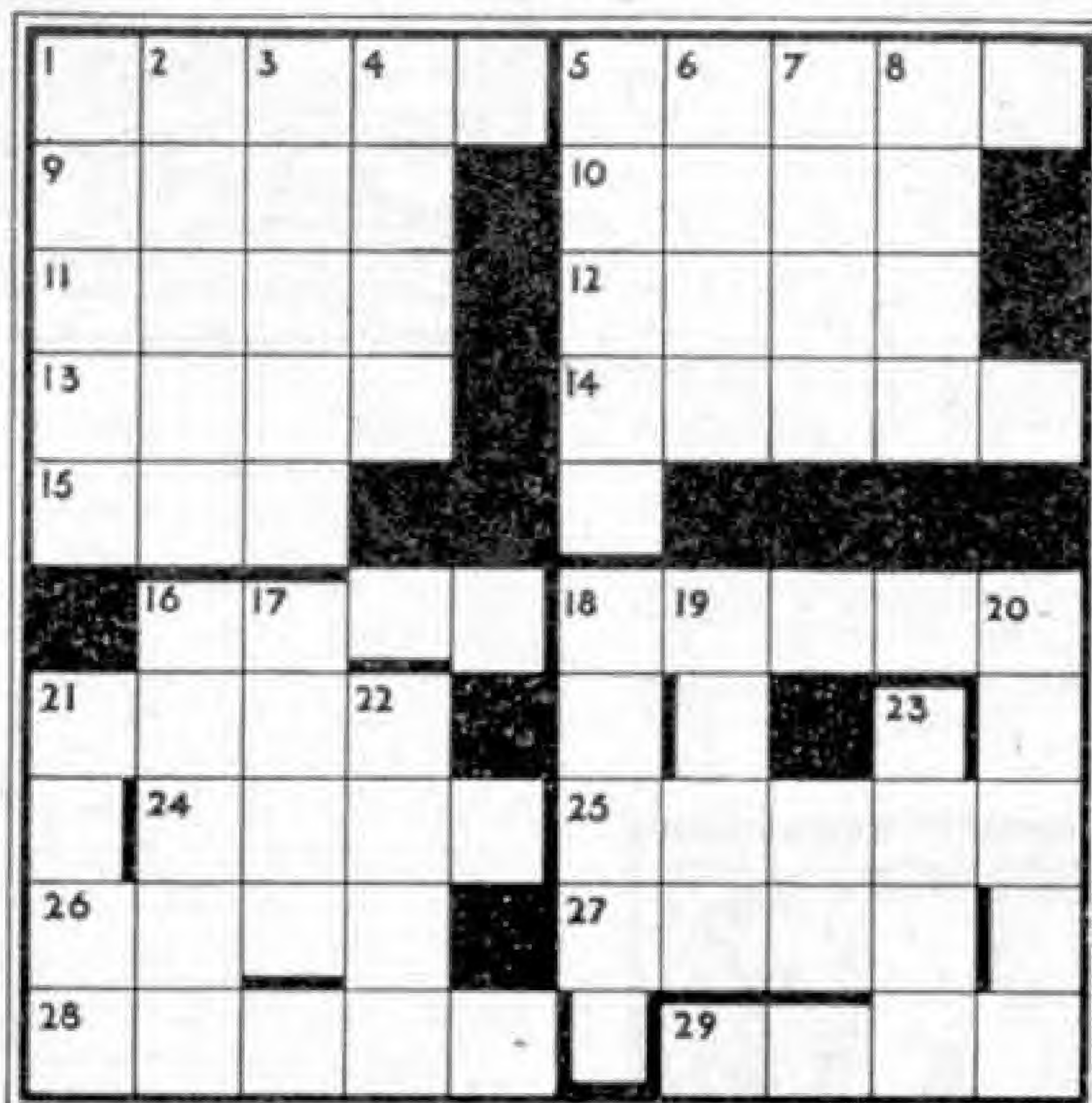
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A Locomotive Cross-Number Puzzle

CLUES ACROSS

1. Ex-Servicemen Affair.
5. Lancashire resort.
9. An Earl.
10. Gloucestershire Abbey.
11. G.W.R. chief.
12. G.W. Hall.
13. Cider county.
14. Famed for gold.
15. A South Wales tank.
16. A pannier tank.
18. But not the Wembley runners-up.
21. Mid-Wales Castle.
24. A 4-4-0.
25. A "Claud."
26. British monarch.
27. Once G.W.R.
28. A Scottish Class 5.
29. Two Queens of this name.



CLUES DOWN

1. Flagship in decisive battle.
2. Famous locomotive engineer.
3. A Scottish tank.
4. A "Great" railway.
5. Heavenly body.
6. A G.W.R. Castle.
7. Another Hall.
8. Trail blazers.
16. Kentish town.
17. Well-remembered King.
18. Town in Belgium.
19. Noted for plums.
20. More trail blazers?
21. Name of a railway too.
22. English county.
23. English Princess.

British Railways re-numbering is now sufficiently well advanced to allow us to present readers with another of our popular locomotive cross-number puzzles. This is built up on the same lines as an ordinary crossword puzzle, but the numbers of the locomotives to which the clues lead are required instead of their names. For instance, the solution to 1 down is "Victory." The British Railways engine of this name is numbered 45712, and it is these figures that go in the five squares below that numbered 1.

In one instance the former L.M.S. number is used instead of the British Railways number. In their solutions

entrants must indicate which this is.

Competitors must not cut out the square, but must prepare their entries on a separate sheet of paper. These should be addressed to "July Cross Number Puzzle, Meccano Magazine, Binns Road, Liverpool 13." There will be two sections, for Home and Overseas readers respectively, and in each there will be prizes to the value of 21/-, 15/- and 10/6, with Consolation Prizes for other good efforts. In the event of a tie the judges will take neatness and originality into consideration.

Closing dates: Home Section, 31st August, Overseas Section, 30th November.

Ship Drawing Contest

It is now some time since readers were given an opportunity of showing their skill in drawing. The number of entries received in drawing competitions is evidence that they are welcome, and this month we provide another opportunity. The subject too will be popular, for in our contest we ask competitors to submit drawings of ships and boats of any kind, in any surroundings they choose. Entries may be in colour, but competitors must remember that it is the drawing itself on which the judges will rely.

There will be the usual two sections in this contest, for Home and Overseas readers respectively, and in each there will be two classes, one for competitors of 12 years of age or more and the other for those under 12. In each of the four divisions of the competition prizes of 21/-, 15/- and 10/6 will be awarded for the best entries in order of merit and there will be Consolation Prizes for other good efforts. Entries must be addressed "July Drawing Contest, Meccano

Magazine, Binns Road, Liverpool 13." Closing dates: Home Section, 31st August, Overseas, 30th November.

July Photographic Contest

The seventh of our 1950 series of photographic contests is a general one, in which we invite readers to send in prints of any subject. There are only two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents.

The competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate Overseas Sections. In each section prizes of 21/-, 15/- and 10/6 will be awarded. Entries should be addressed: "July Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13." Closing dates: Home Section, 31st July; Overseas Section, 31st October.

Competition Results and Solutions

HOME

JANUARY 1950 COVER VOTING CONTEST

1st Prize: D. J. Yates, St. Helens. 2nd Prize: P. Nattress, South Shields. 3rd Prize: D. K. Thomas, Yelverton. Consolation Prizes: F. D. Young, Birmingham 21; D. Beckett, St. Neots; A. N. Round, Altrincham.

JANUARY 1950 DRAWING CONTEST

1st Prize: Section A: D. Burks, Markyate; Section B: Miss A. Crosby, Appleby. 2nd Prize, Section A: A. W. Leitch, Bawdeswell; Section B: E. Bryne, Manchester. 3rd Prize, Section A: A. Cocozza, Motherwell; Section B: I. B. Dunn, Helensburgh. Consolation Prizes, Section A: D. G. Evans, Corris; B. Chapman, London E.11; Miss R. I. Ulingworth, Edinburgh 10; Miss B. G. Harker, Middlesbrough; M. Barnett, Middlesbrough. Section B: M. Strong, West Kirby; B. Thelwell, Liverpool; F. Tinlin, Newcastle.

FEBRUARY 1950 PHOTOGRAPHIC CONTEST

1st Prize: Section A: T. Jones, Old Colwyn; Section B: B. Fuggle, Helston. 2nd Prize, Section A: N. V. Salt, Stoke-on-Trent; Section B: M. Chubb, Littlehampton. 3rd Prize, Section A: I. Law, London S.W.20; Section B: R. W. Hardy, Withernsea. Consolation Prizes, Section A: H. North, Nottingham; E. Emrys Jones, Old Colwyn; M. England, Maidstone; J. K. Ingham, Cambridge; Section B: P. Taylor, Lydden; R. H. Weeks, Carlisle; D. Hudson, Purley.

OVERSEAS

SEPTEMBER 1949 PHOTOGRAPHIC CONTEST

1st Prize, Section A: G. Ditchfield, Dunedin N.E.1, N.Z.; Section B: P. Jackson, Pietermaritzburg, Natal, S. Africa. 2nd Prize, Section A: A. R. Tinckam, Sydney, Australia; Section B: J. Palmer, Wellington, N.Z. 3rd Prize, Section A: K. R. Cassells, Wellington S.W.1, N.Z.; Section B: V. Tewma, B'Kara, Malta G.C. Consolation Prizes, Section A: N. V. Murray, Auckland, N.Z.; K. J. Milne, Hawke's Bay, N.Z. Section B: C. Smith, Rakaia, N.Z.; J. Xuereb, Valletta, Malta G.C.; C. J. Green, Salisbury, S. Rhodesia; E. Taylor, Dublin, Eire; C. Formby, Johannesburg.

OCTOBER 1949 CROSSWORD PUZZLE

1st Prize: P. E. Wright, Auckland, N.Z. 2nd Prize: R. J. Boland, Cork, Eire. 3rd Prize: G. Thake, Birkirkara, Malta G.C. Consolation Prize: D. Campbell, Canterbury, N.Z.

OCTOBER 1949 LOCOMOTIVE NAMES CONTEST

1st Prize: R. A. Green, Amsterdam, Holland. 2nd Prize: D. J. White, Christchurch N.1, N.Z. 3rd Prize: L. Sheedy, Sydney, Australia. Consolation Prize: H. Gillespie, Pretoria, S. Africa.

OCTOBER 1949 PHOTOGRAPHIC CONTEST

1st Prize, Section A: Miss A. F. Neilson, Pleasant Point, N.Z. Section B: M. Smith, Auckland, N.Z. 2nd Prize, Section A: L. Humm, Geraldine, N.Z.; Section B: R. Rutherford, New Plymouth, N.Z. 3rd Prize, Section A: R. D. Boyle, Hawke's Bay, N.Z. Section B: G. W. Robinson, Sydney, Australia. Consolation Prizes, Section A: Miss N.

Bedlington, Auckland, N.Z.; H. Arnold, Dublin, Eire; D. Fennelly, Galway, Eire. Section B: V. S. Murthy, Tellippalai, N.P., Ceylon; B. Armstrong, Cathcart, S. Africa.

NOVEMBER 1949 PHOTOGRAPHIC CONTEST

1st Prize, Section A: L. Paterson, Cork, Eire; Section B: S. Z. Alley, Calcutta 14, India; 2nd Prize, Section A: E. Gibson, Montreal, Canada; Section B: J. W. McCulloch, Bay of Plenty, N.Z. 3rd Prize, Section A: K. Froud, Salisbury, S. Rhodesia; Section B: M. Mason, Pretoria, S. Africa. Consolation Prizes, Section A: J. L. Yates, Calgary, Canada; Section B: P. R. Bland, Leix, Eire; F. K. Hoflich, Windhoek.

SOLUTIONS

DECEMBER 1949 ADVERTISEMENT CONTEST

Allan, xiv; Astra, xiv; Bayko, xvi; Blackbird, 500; Bond's, x; B.S.A., viii; Dunlop, vi; Dyke, 490; ERG, 500; Gamages, iv; Gem, 492; Hobbies, vii; Hornby, Back Cover; I.C.S., 499; Johnson, xv; Keef, 492; Meccano, Inside Front Cover; Saunders, 490; Sparks' xiv; Spear, ii; Wolsey, xiii.

DECEMBER 1949 QUIZ CONTEST

1. Waterloo, London, S.R. 2. Snow Hill, Birmingham, W.R. 3. North Road, Plymouth, W.R. or Darlington, N.E. 4. Pier Head, Liverpool, Liverpool Overhead Railway, or Ryde, S.R. 5. Seaside, Aberavon, W.R. 6. Shrub Hill, Worcester, W.R. 7. Woodside, Birkenhead, W.R. 8. Castle, Lancaster, L.M.R. 9. Riverside, Liverpool, M.D. and H.B. 10. Bank Quay, Warrington, L.M.R. 11. St. Davids, Exeter, W.R. and S.R. 12. Waverley, Edinburgh, Sc.R.

JANUARY 1950 COVER VOTING CONTEST

1st, July; 2nd, August; 3rd, January; 4th, June; 5th, September; 6th, December; 7th, October; 8th, November; 9th, March; 10th, May; 11th, April; 12th, February.

FEBRUARY 1950 CODE PUZZLE

Page 72. "One of the most comprehensive schemes now in progress for making use of water power is that of the New Zealand State Hydro-Electric Department for generating current from the flow of the Waikato River, the longest in New Zealand."



"Becalmed." Photograph of Tenby Harbour submitted by E. Martin, Newcastle; awarded 2nd Prize in this year's January Sec. B (Home) Photographic Contest.

Drilling an Oil Well—(Continued from page 291)

mean that work on the well has to be abandoned.

Another problem arises from the fact that in rotary drilling there is a tendency for the boring to become crooked as the well deepens. For a well to depart from the vertical is a very serious matter, for if left unchecked a deviation of, say only 5 deg. in a 5,000-ft. well, would result in the well bottom being 437 ft. away from its intended position, possibly outside the oil-bearing zone entirely.

When an oil-bearing formation is reached, precautions have to be taken to ensure that the well is "brought in" under proper control. Sometimes this can be achieved by merely removing the drilling string and gradually reducing the weight of mud sufficiently to allow the oil to flow. When oil or gas is under very high pressure, however, the weight of mud may be insufficient to control the flow, and resort is made to "pressure drilling." For this purpose a "blow-out preventer" is fitted to the well-head through which the drillpipe can be passed and rotated under pressure, thus avoiding the possibility of the drillpipe being blown clean out of the well or pressure escaping upward through the drillpipe.

The well is finally brought in by reducing the pump pressure after drilling has been completed and the drilling string removed. At this stage, output is controlled by a series of valves and pipes which is located at the well-head and is known as a "Christmas Tree." When the underground pressure is insufficient to cause the oil to flow up the well unaided it is necessary to resort to pumping, or lifting the oil by the injection of gas through tubing.

Fast Freight Ships of To-day—(Cont. from page 302)

that such a well-equipped tanker has aroused much admiration. The "*C. J. Hambro*" has been chartered by the Anglo-Saxon Petroleum Co. for a similar period.

The names of the P. and O. express freighters are historic. The first "*Coromandel*," a mail and passenger steamer, was built at Greenock in 1885. She was run on various services, to Australia, Calcutta, Bombay and China, and during the nineties she served as a transport and hospital ship in the Ashanti War. She went to the breaker's yard in 1908.

The "*Shillong*" is the second P. and O. ship to bear that name, which is derived from an important tea centre in Assam. The original "*Shillong*" was completed in 1939 for the United Kingdom-Calcutta trade, but was torpedoed in April 1943 when eight days from New York on her way to England. She sank in twelve minutes.

There have been a "*Somali*" and a "*Soudan*" in the P. and O. fleet since 1901, and the ships have always been sister vessels. The first pair were broken up in the 1920's. The second pair, built in 1930 and 1931, were fine modern cargo ships of 6,700 tons. Both were lost in the 1939-1945 war. The "*Somali*" was sunk by an enemy plane in the North Sea in 1941. The "*Soudan*" had to be abandoned in the South Atlantic in 1942, when she struck a mine. All hands were saved, although the men in the second officer's boat were adrift for six days before they were rescued.

Britain's proud record of shipbuilding is being well maintained by the construction of such well-equipped, fast cargo ships as these to replace the wartime losses and provide the fastest-ever service for shippers and merchants.

Fighting the Avalanche—(Continued from page 307)

personnel have evolved a technique that is proving highly successful. Knowing the places of danger, they are able to control many of the avalanches by dispersing the snow mass before it has a chance to get under-way. This they do by exploding small mines which break up the mass. Where the snow mass is too large for the mines to be effective, it is subjected to a barrage from mortars kept for the

purpose. This method of dispersal by gunfire is very useful against avalanches that threaten railways, roads or ski runs, or are forming in a position where they are likely to endanger human habitations. It is of course necessary to take care that the explosions designed to break one avalanche do not start another one near by.

Certain Spring avalanches descend in identical spots year after year. In these areas the Swiss have spent great sums in building strong stone galleries and in mining tunnels through the solid rock to protect the roads and railways. There are a great number of these galleries and tunnels in the Zuge, near Davos.

If the path of the avalanche lies over fairly open country which does not slope steeply, the great snow mass will often slide down gently without doing harm, and it is allowed to take its natural course. But if the disposition of the ground is such that a great mass of snow is collected in an area with a narrow outlet, the heavy pressure will force the snow through the bottleneck at irresistible speed. Loosened snow from the mountain sides comes to swell the snow mass, which hurtles down the mountain until it reaches a barrier strong enough to stop it.

The first natural line of defence against avalanches is the range of Swiss mountain forests. For this reason Swiss forestry laws are strict and nobody may cut down a tree, even on his own property, without permission from the Department of Forestry. On the lower slopes, the Research Station has sponsored the erection of huge barriers of wooden piles driven deep into the ground in the known avalanche tracks. These piles are strengthened by lacings of wattle.

Using the Meccano Gears Outfit—(Cont. from p. 321)

Gear 6 and 1" Pulley, and is passed over two $\frac{3}{4}$ " Washers spaced by two ordinary Washers. It is then taken over the $\frac{1}{2}$ " loose Pulley on the carriage, round the pulley block and finally is tied at 20.

The cab roof is assembled from six $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates, and is attached by an Obtuse Angle Bracket at each corner to a vertical $2\frac{1}{2}$ " Strip bolted to the side of the jib. The leading pair of $2\frac{1}{2}$ " Strips serve also as supports for the $1\frac{1}{2}$ " Strips forming bearings for the 5" Rod 9.

Parts required to build model Hammerhead Crane:
6 of No. 1; 14 of No. 2; 4 of No. 3; 2 of No. 4; 12 of No. 5; 2 of No. 6a; 4 of No. 8; 3 of No. 10; 4 of No. 11; 16 of No. 12; 2 of No. 12a; 4 of No. 12c; 1 of No. 14; 2 of No. 15; 1 of No. 15a; 3 of No. 16; 1 of No. 17; 3 of No. 18a; 2 of No. 19b; 3 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 23a; 1 of No. 24; 14 of No. 35; 116 of No. 37; 10 of No. 37a; 18 of No. 38; 2 of No. 38d; 2 of No. 40; 1 of No. 44; 2 of No. 48; 4 of No. 48a; 2 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 1 of No. 57c; 4 of No. 59; 2 of No. 90; 2 of No. 111; 2 of No. 111a; 3 of No. 111c; 1 of No. 125; 2 of No. 126; 4 of No. 126a; 1 of No. 176; 2 of No. 188; 4 of No. 189; 6 of No. 190; 2 of No. 191; 4 of No. 192; 1 of No. 212; 1 No. 1 Clockwork Motor; 1 Gears Outfit "A."

THE 1950 MODEL ENGINEER EXHIBITION

The Model Engineer Exhibition will celebrate its Jubilee this year at the New Horticultural Hall, Westminster, S.W.1, from 9th to 19th August. A wide range of all the latest type of models will be on show, including aeroplanes, cars, speedboats, yachts, locomotives and engines, and in many instances demonstrations will be given of how they are made. Constructional sets and the tools and equipment necessary to the model maker will occupy an important part of the trade stands.

Makers of models of all classes are invited to take part in the competition for valuable prizes, details of which are obtainable from the Exhibition manager.

The exhibition is open from 12 noon to 9 p.m. on the first day and from 11 a.m. to 9 p.m. on other days, except Sunday. The admission charges are 2/3 for adults and 1/- for children.

Fireside Fun

"When I was young I could jump over a five-barred gate after a five mile run."

"And I suppose that with a ten mile run you could have jumped over one twice as high."



"You're not old enough to buy cigarettes."
"I will be when I get served!"

"Smith, if somebody left you a million pounds or more what would you be?"

"Away, sir, as quickly as possible."

"I would like to paint your delightful cottage. I hope you don't mind."

"Don't mind? Look 'ere, young man, nobody but Sam Higgins has ever painted my 'ouse, an' nobody else ever will as long as 'e's alive."

"I say, waiter, here's a dead fly swimming around in my tea."

"Impossible, sir. Dead flies don't swim."

"What would Neptune have said if the seas had dried up?"

"I can't guess. What would he have said?"

"I haven't a notion."



"I'm sorry to have to do this, Rodney, but we must share the suspicion!"

BRAIN TEASERS

TIPPING TOTALS

A car park attendant had received £1 in tips. Twice as many women drivers as men drivers had tipped him, each man giving twice as much as each woman. He pointed out that if each woman driver had given him the amount received from each man and vice versa he would have had 5/- more. The number of cars using the park had been 60. How many women drivers were there?

STILL 24 CORNERS

Arrange 20 matches in three squares and four triangles in such a way that on removing two matches you get six squares and no triangles.

SCORE A CENTURY

The numbers 1 to 7 add up to 28. Can you write them down in such a way that the total is exactly 100?

LEVELLING UP

Albert, Bob and Charlie went to buy Meccano-Parts and spent $\frac{1}{7}$ th, $\frac{1}{4}$ th and $\frac{1}{3}$ rd of their money respectively. When they left the shop each had the same amount left, and if Charlie had given Albert 3/- on entering they would have had the same amount each then. How much did each spend? S.W.C.



"Excuse me, sir, what's the subsoil here?"
"Tins."

SOLUTIONS TO LAST MONTH'S PUZZLES

The purchaser of our first puzzle last month bought 19 pears, 80 grapes and one apple, a total of 100 fruit, the total cost of which was 100 c.

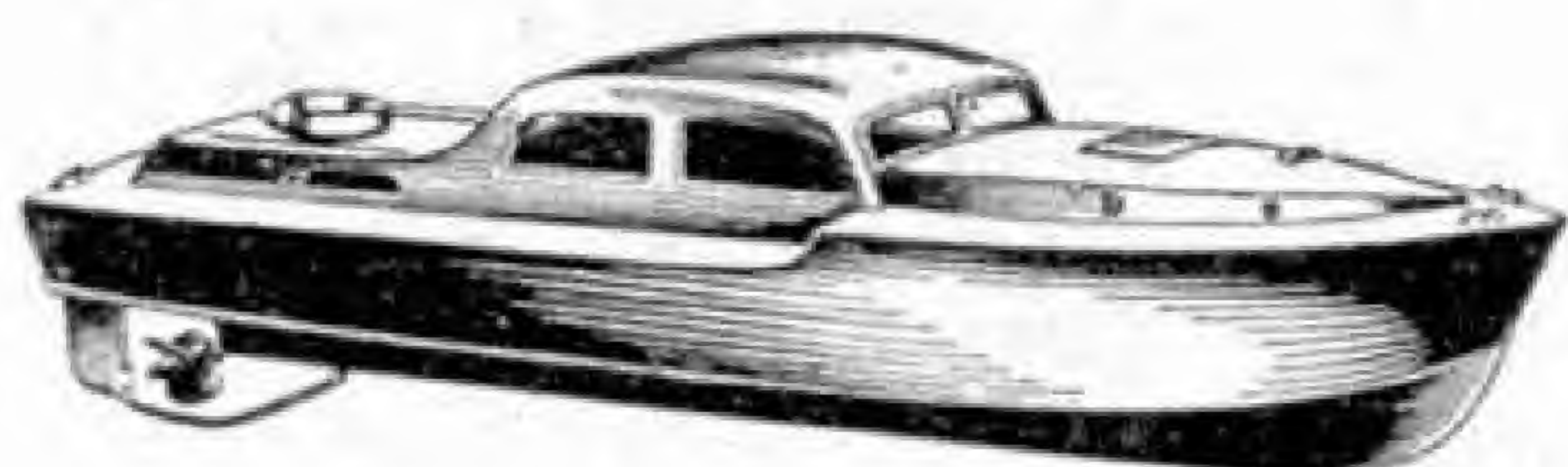
Our second puzzle could be solved most quickly by noting that $7\frac{1}{2}$ d. is $\frac{1}{4}$ of half a crown and therefore $\frac{1}{32}$ of £1. It is then easy to see in 15 seconds that $7\frac{1}{2}$ d. is contained 32 million times in £1,000,000.

There was a trick in our third puzzle. Half the male members giving 5/- each is the same as all of them giving $\frac{2}{6}$ each. Similarly $\frac{1}{3}$ of the lady-members giving $\frac{7}{6}$ is equivalent to each one giving $\frac{2}{6}$. As there are 400 members altogether, then the sum of money raised was 400 times $\frac{2}{6}$, that is £50.

The first of our palindromes is NO IT IS OPPOSED; ART SEES TRADES OPPOSITION. The second palindromes is NAME NO ONE MAN.

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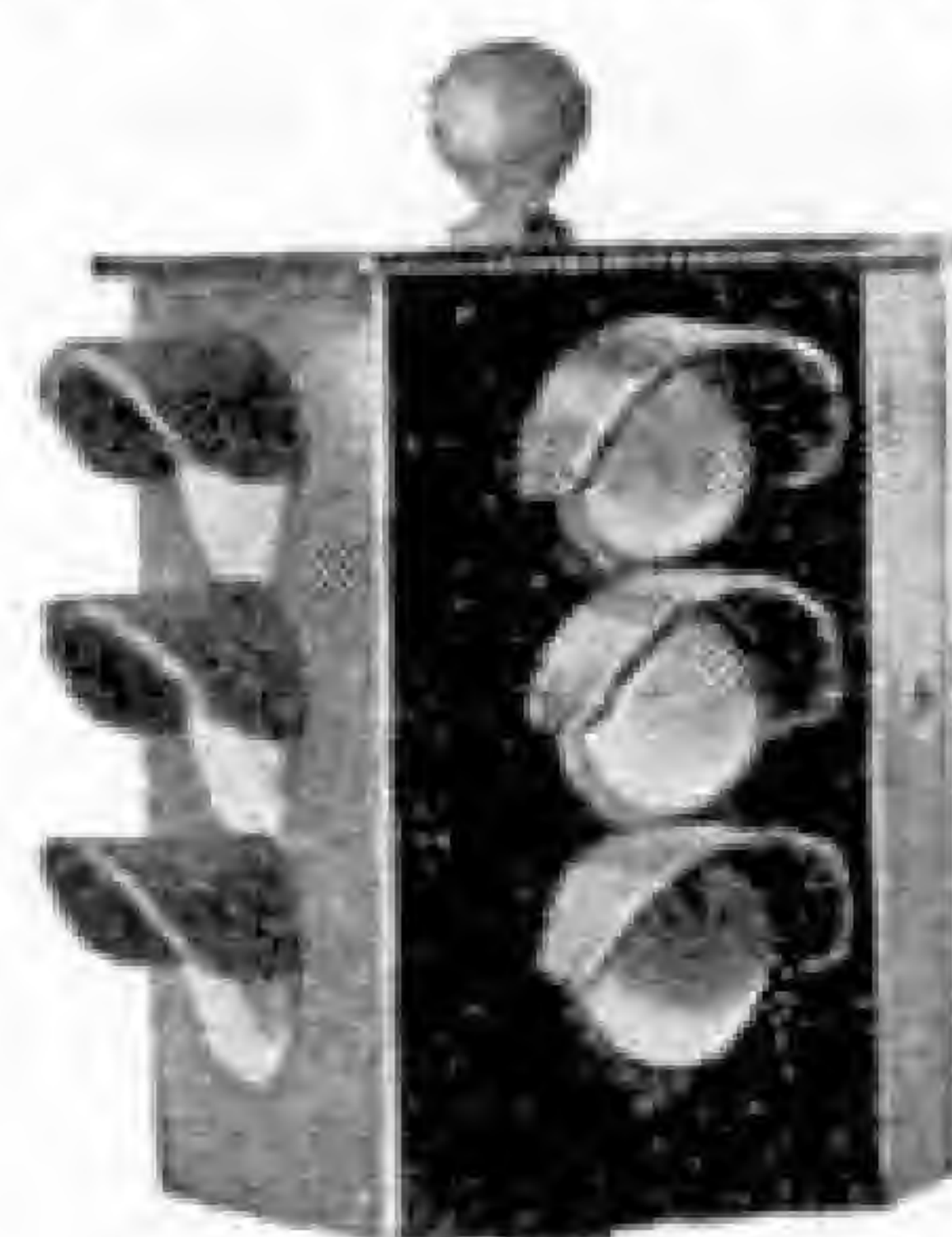
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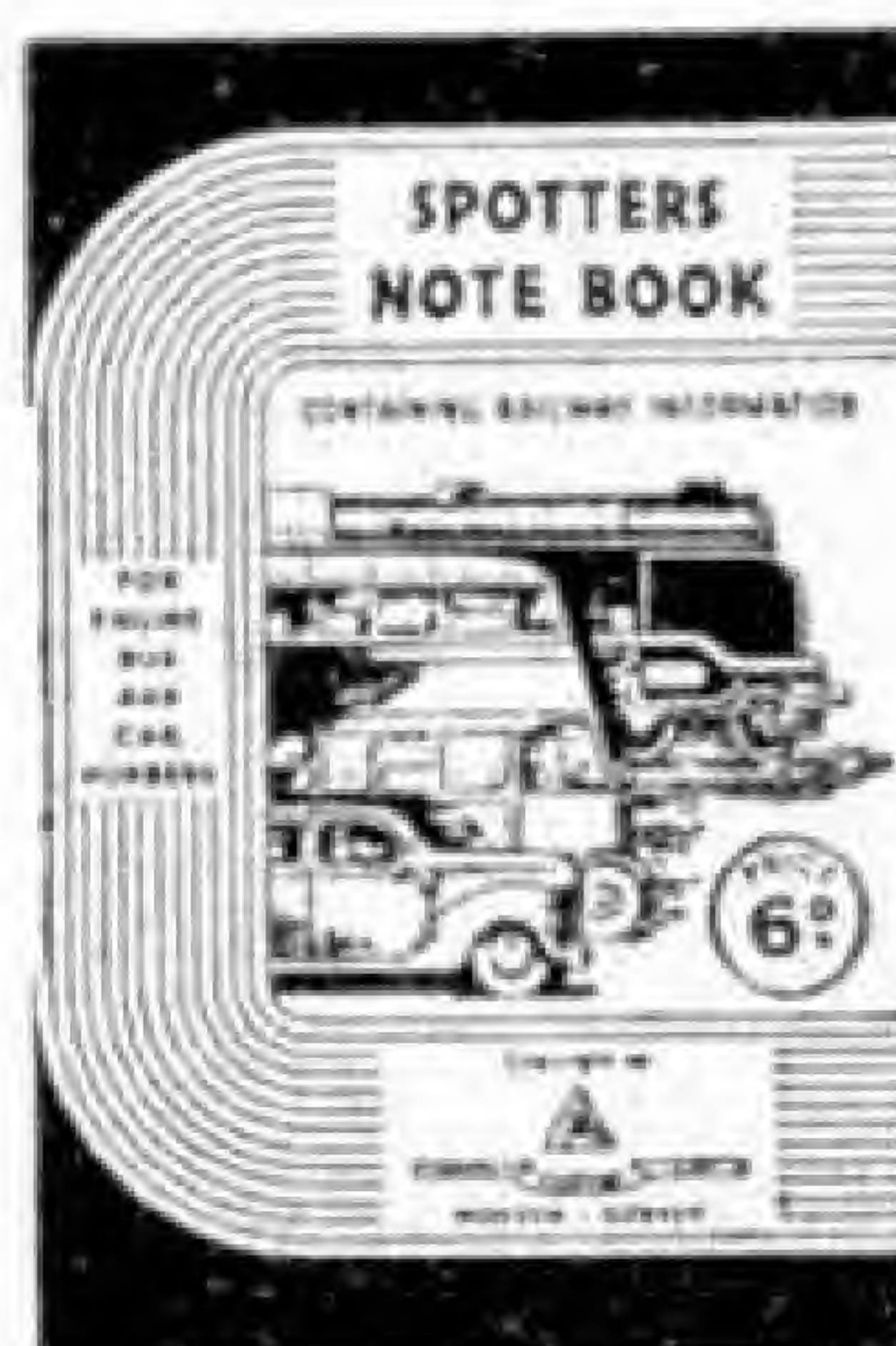
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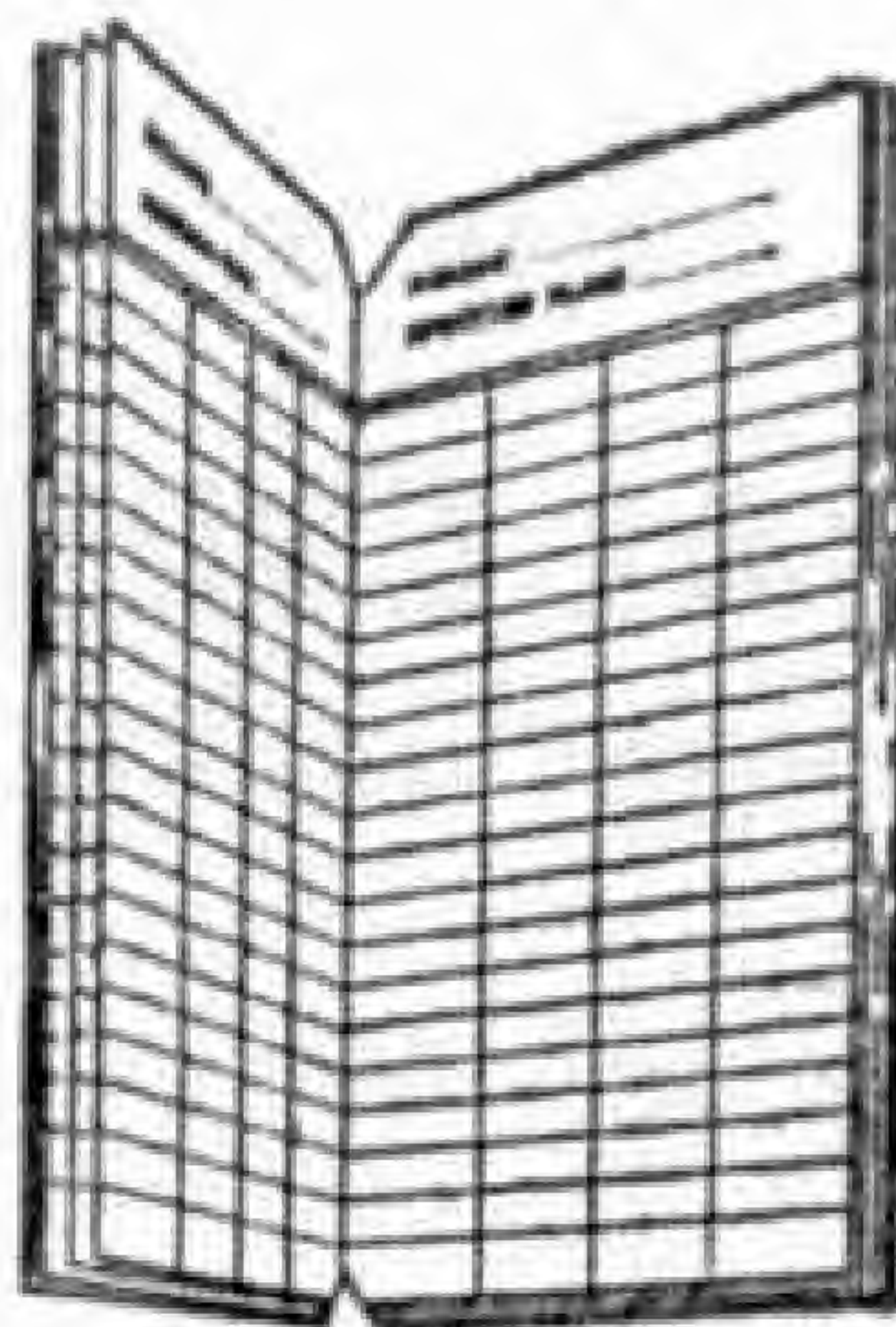
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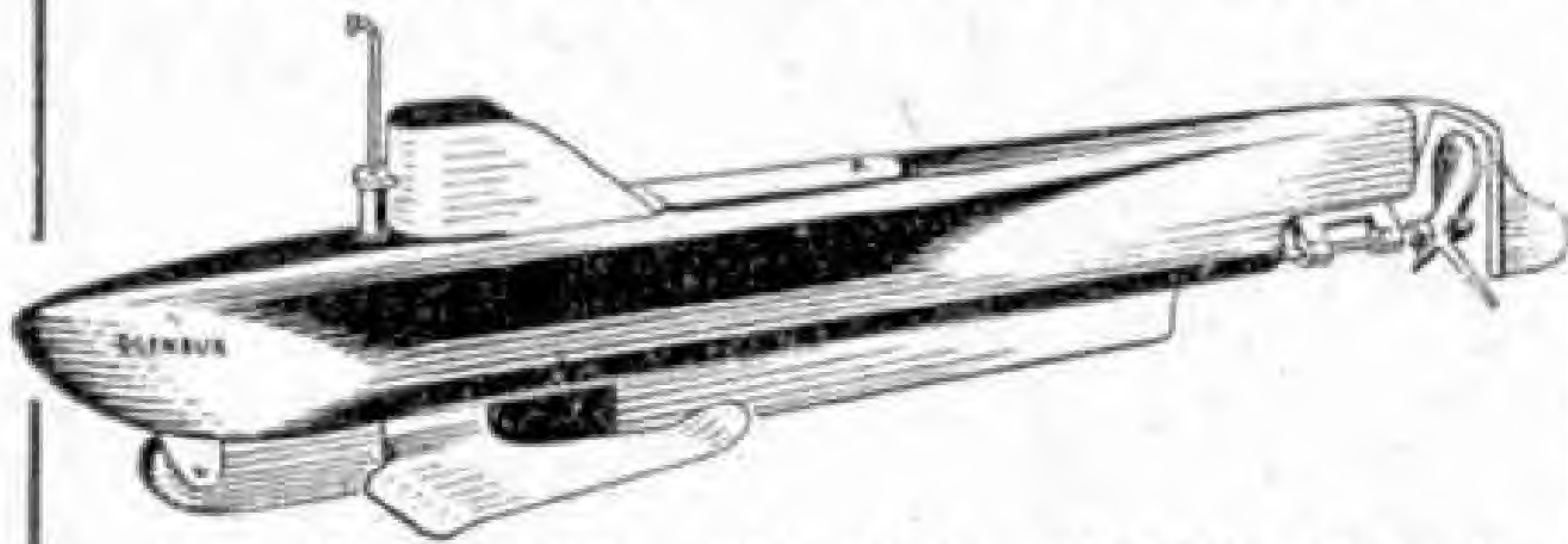
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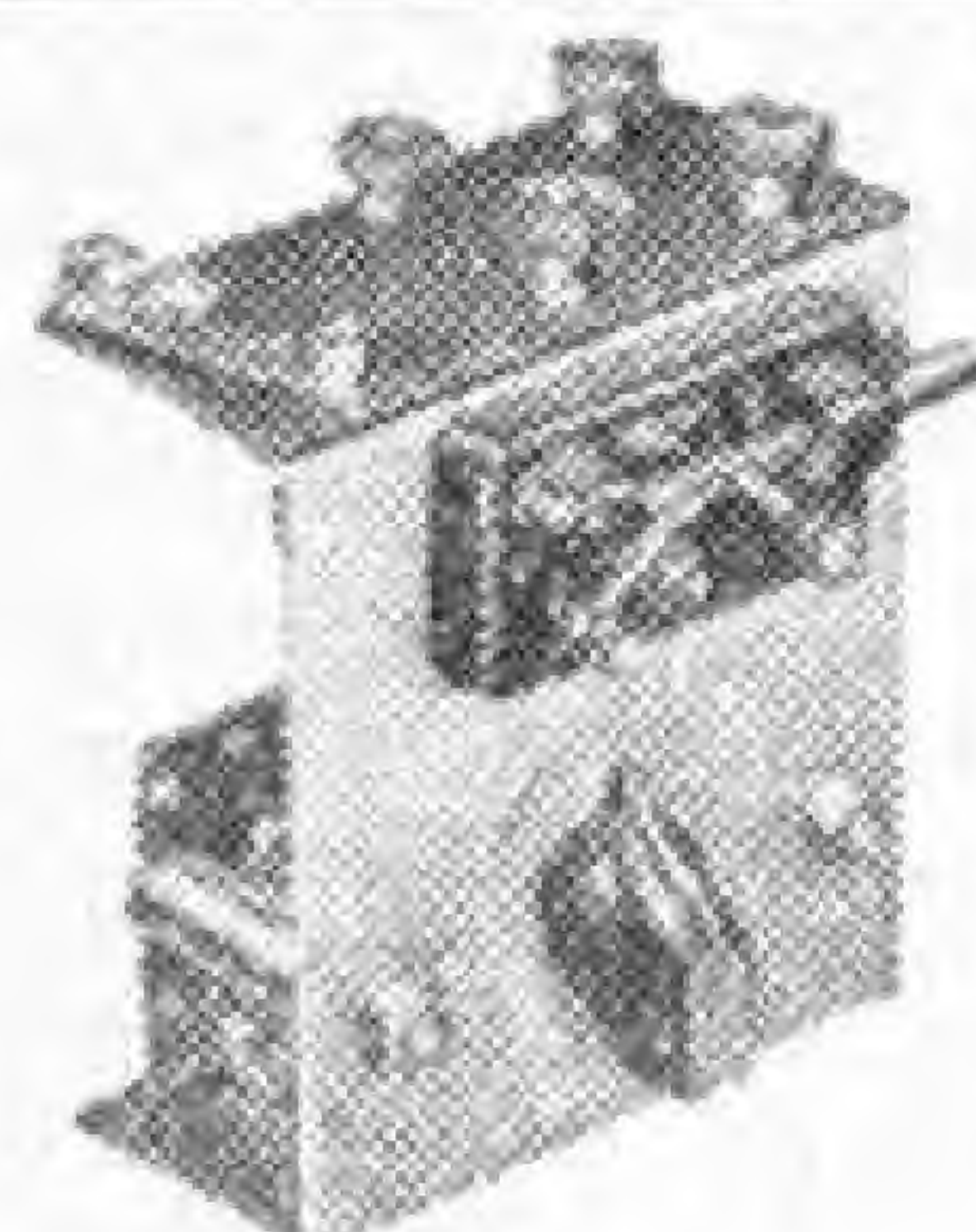
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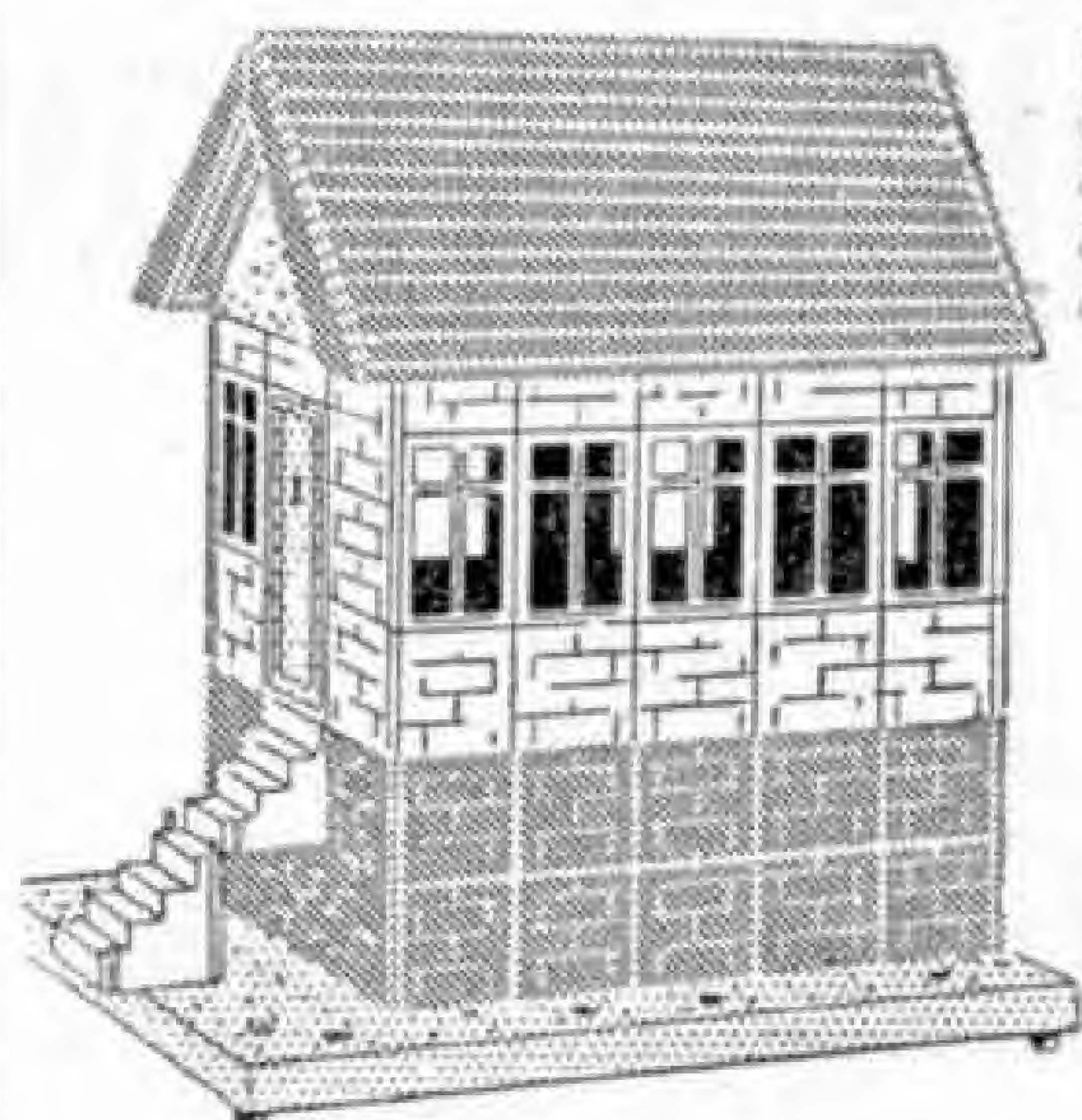
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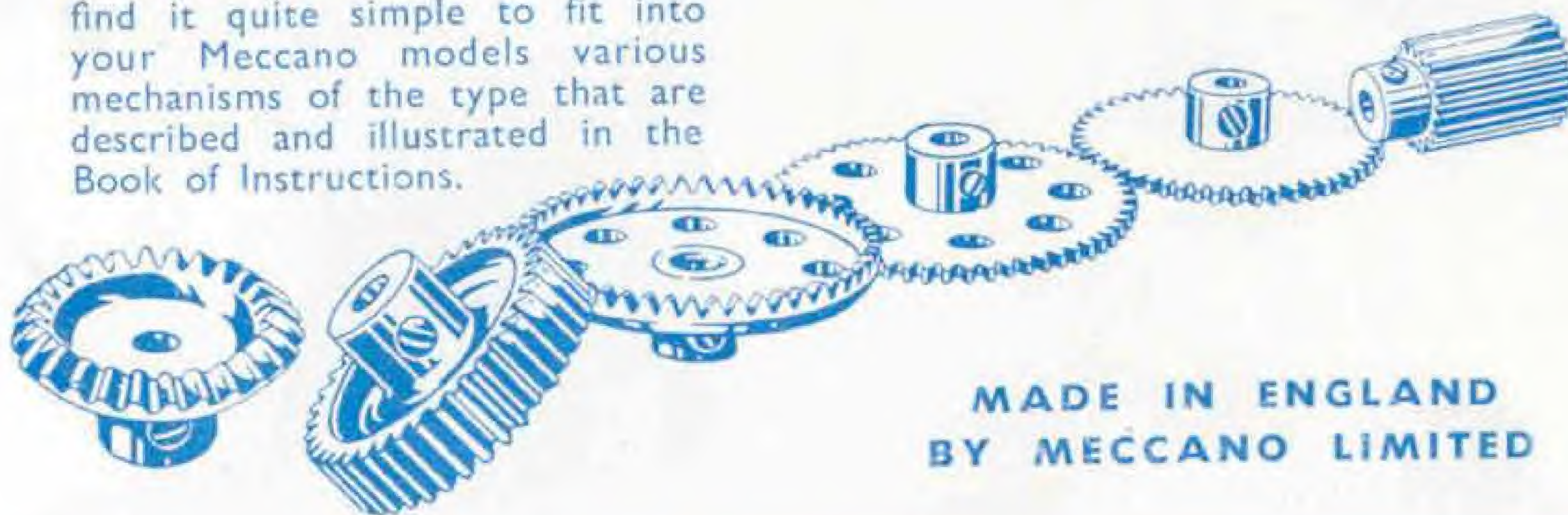
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